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Report No: 80488-PK

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 379.7 MILLION
(US$588.4 MILLION EQUIVALENT)

AND A

PROPOSED IDA GUARANTEE IN THE AMOUNT OF
US$460 MILLION EQUIVALENT

TO THE

ISLAMIC REPUBLIC OF PAKISTAN

FOR THE

DASU HYDROPOWER STAGE I PROJECT (DHP-I)

May 14, 2014

Sustainable Development Department
Energy Sector Unit
South Asia Region

CURRENCY EQUIVALENTS

Currency Unit	=	Pakistan Rupees (PKR)
US$	=	100 PKR
SDR	=	1.54969 USD

FISCAL YEAR
July 1 – June 30

Weight and Measures

Metric System

1 meter (m)	=	3.280 feet	1 hectare (ha)	=	2.470 acres
1 Kilometer (km)	=	0.620 miles	1 cubic meter (m)	=	35.310 cubic feet

1 million acre feet (MAF) = 1.234 billion cubic meters
1 cubic foot/second (cfs) = 0.0283 cubic meters/sec (m^3/sec)

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AEDB	Alternative Energy Development Board
ASL	Above sea level
AGP	Accountant General of Pakistan
BCM	Billion Cubic Meters
CAS	Country Assistance Strategy
CCGT	Combined Cycle Gas Turbine
CGA	Controller General of Accounts
CPF	Country Partnership Framework
CPPA	Central Power Purchasing Agency
CPS	Country Partnership Strategy
CQ	Consultants' Qualification
CSCs	Construction Supervision Consultants
CSO	Civil Society Organization
DA	Designated Account
dgMarket	Development Gateway Market
DA	Designated Account
DB	Diamer-Basha
DBHP	Diamer-Basha Hydropower Project
DDC	District Deputy Commissioner
DFIs	Development Finance Institutions
DHP	Dasu Hydropower Project
DISCO	Distribution Company
DP	Development Partner
DPC	Development Policy Credit
DSCR	Debt Service Coverage Ratio
DSM	Demand Side Management
DTL	Dasu Transmission Line
EA	Environmental Assessment
EAD	Economic Affairs Division
EARF	Environmental Assessment and Review Framework
ECAs	Export Credit Agencies
ECP	Environmental Codes of practice
EFF	Extended Fund Facility
EHS	Environment, health and safety
EIA	Environmental Impact Assessment
ESMP	Environmental and Social Management Plan
EMPA	Environmental Management Action Plan
ERR	Economic Rate of Return
ESA	Environmental and Social Assessment
ESIA	Environmental and Social Impact Assessment
ESIC	Environment Social Impact Cell
EMU	Environment and Social Management Unit
ESS	Environment and Social Supervisor
FATA	Federal Administrative Tribal Area
FBS	Fixed Budget Selection
FGD	Focus Group Discussions
FM	Financial Management

FMS	Financial Management Specialist
FMIS	Financial Management Information System
FODP	Friends of Democratic Pakistan
GAAP	Governance and Accountability Action Plan
GAC	Governance and Anti-Corruption
GBHP	Ghazi Barotha Hydropower Project
GDP	Gross Domestic Product
GEO	Global Environmental Objectives
GENCO	Generation Company
GHG	Greenhouse Gas
GLOFs	Glacier lake outbursts
GM	General Manager
GMRC	Glacier Monitoring and Research Center
GoP	Government of Pakistan
GPN	General Procurement Notice
GRC	Grievance Redress Committee
GWh	Gigawatt hour
HPP	Hydropower Plants
HT	Headrace Tunnel
HUBCO	Hub Power Company
IBRD	International Bank for Reconstruction and Development
IBWS	Indus Basin Water System
IBWT	Indus Basin Water Treaty
ICB	International Competitive Bidding
ICR	Implementation Completion Report
ICS	Individual Consultant Selection
IDA	International Development Agency
IDC	Interest During Construction
IFC	International Financing Corporation
IFIs	International Financial Institutions
IFR	Interim Financial Report
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IPCC	International Panel on Climate change
IPPs	Independent Power Producers
IPOE	Independent Panel of Experts
IRSA	Indus River System Authority
IS	Implementation Support
ITB	Instruction to Bid
IUCN	International Union for Conservation of Nature
JV	Joint Venture
KAPCO	Kot Addu Power Company
KCCA	Kaigah Community Conservation Area
KESC	Karachi Electric Supply Corporation
KKH	Karakoram Highway
KKHP	Keyal Khawr Hydropower Project
KV	Kilovolt
KP-EPA	Khyber Pakhtunkhwa Environment
KPK	Khyber Pakhtunkhwa
kWh	Kilowatt hour
LAA	Land Acquisition Act
LCS	Least Cost Selection
LARF	Land Acquisition Resettlement Framework
LLO	Low Level Outlets
LNG	Liquefied natural gas
LOI	Several letters of intent
MD	Managing Director
MIGA	Multilateral Investment Guarantee Agency
MOWP	Ministry of Water and Power
M&E	Monitoring & Evaluation
M&ECs	Monitoring & Evaluation Consultants
MTBF	Medium Term Budgetary Framework
MW	Megawatt
NCB	National Competitive Bidding
NEPRA	National Electric Power Regulatory Authority
NGO	Non-Governmental Organization
NHA	National Highway Authority
NPCC	National Power Control Center
NPV	Net Present Value
NTDC	National Transmission and Dispatch Company Limited
NWFP	North-West Frontier Province
O&M	Operation and Maintenance
ORAF	Operational Risk Assessment Framework
PAD	Project Appraisal Document
PAPs	project Affected Persons
PCG	Partial Credit Guarantees
PCPP	Public consultation and Participation Plan
PFM	Public Financial Management
PH	Power House
PD	Project Director
PCR	Physical and Cultural Resources
PDO	Project Development Objectives
PEPA	Pakistan Environmental Protection Agency
PEPCO	Pakistan Electric Power Company
PKR	Pakistani Rupee
PM&EC	Project Management Support and Monitoring and Evaluation Consultants
PMU	Project Management Unit
PPIB	Private Power and Infrastructure Board
PPO	Power Purchase Organization

PPP	Public-private partnership
PQ	Pre-qualification
PRA	Participatory Rural Appraisal
PRSP	Poverty Reduction Strategy Paper
PSDP	Public Sector Development Program
PSIHP	Pakistan Snow and Ice Hydrology Project
PSC	Project Steering Committee
PSRDP	Power Sector Reform Development Policy Credits
QBS	Quality Based Selection
QCBS	Quality and Cost Based Selection
RAB	Regulatory Asset Base
RAP	Resettlement Action Plan
RCC	Roller Compacted Concrete
RFO	Residual Fuel Oil
ROR	Run-of the-River
SDR	Special Drawing Rights
SIL	Specific Investment Loan
SOPs	Standard Operating Procedures
SRMP	Social and Resettlement Management Plan
SSESA	Strategic Sector Environmental and Social Assessment
SSS	Single Source Selection
T&D	Transmission and Distribution
T4HP	Tarbela Fourth Extension Hydropower Project
TA	Technical Assistance
TEC	Technical Evaluation Committee
TMP	Traffic Management Plan
TOR	Terms of Reference
TT	Tailrace Tunnels
UIB	Upper Indus Basin
UNDB	United Nations Development Business
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention for Climate Change
WAPDA	Water and Power Development Authority
WBG	World Bank Group
WCAP	Water Capacity Building Project
WEC	WAPDA Environmental Cell
WTP	Willingness to pay
WWF	World Wide Fund

Regional Vice President:	Philippe H. Le Houerou
Country Director:	Rachid Benmessaoud
Sector Director:	John Henry Stein
Sector Manager:	Julia Bucknall
Guarantee Manager	Pankaj Gupta
Task Team Leader:	Masood Ahmad

PAKISTAN

DASU HYDROPOWER STAGE I PROJECT (DHP-I)
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IBRD 40383

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DASU HYDOPOWER STAGE-I PROJECT (P121507)
PROJECT APPRAISAL DOCUMENT
South Asia Region
SASDE

Report No.80488-PK

Basic Information			
Project ID: P121507	EA Category: A-Full Assessment		Team Leader: Masood Ahmad
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [N]		
	Financial Intermediaries [ ]		
	Series of Projects [ ]		
Project Implementation Start Date: June 10, 2014	Project Implementation End Date: December 31, 2021		
Expected Effectiveness Date: September 30, 2014	Expected Closing Date: June 30, 2022		
Joint IFC: NO			
Sector Manager	Sector Director	Country Director	Regional Vice President
Julia Bucknall	John Henry Stein	Rachid Benmessaoud	Philippe H. Le Houerou

Borrower: Government of Pakistan			
Responsible Agency: Water and Power Development Authority (WAPDA); General Manager Dasu HPP			
Contact:	Haji Muhammad Farooq	Title:	Project Director
Telephone	+924299202676	Email:	farooqhaji@yahoo.com

Project Financing Data(in USD Million)					
[ ]	Loan	[ ]	Grant	[X]	Guarantee
[X]	Credit	[ ]	IDA Grant		Other

Total Project Cost:	4,247.70 million	**Total Bank Financing:** US$588.4 million and an IDA Guarantee of US$460 million (with IDA Allocation of US$115 million or SDRs 74.3 millions)

Financing Source	**Amount**
BORROWER/RECIPIENT	0.0
Water and Power Development Authority (WAPDA)	**600.0**
National Transmission and Distribution Company (NTDC)	**80.0**
IDA (FY14) (SDRs. 379.7)	**588.4**
Recommitted (SDRs 308.2 million)	477.6
New (SDRs 71.5 million)	110.8
Commercial Financing (Supported by IDA Guarantee)	**1,899.9**
Export Credits (Supported by IDA Guarantee)	**546.0**
Additional Financing IDA Credit FY16	**533.4**
Total	**4,247.7**

Expected Disbursements (in USD Million) of First IDA Credit (FY14)

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022	
Annual	50	70	110	100.	70.	50.	50.	88.4	
Cumulative	50	120	230	330.	400.	450.	500.	588.4	

Proposed Development Objective(s)

The overall project development objective is to facilitate the expansion of electricity supply of hydro-power in Pakistan. The Project would also improve access to socio-economic services for local communities in the project area and build WAPDA's capacity to prepare future hydropower projects. This would be achieved by installing a 2,160 MW hydropower plant on the main Indus River, which can be expanded to 4,320 MW in future at very low cost. The Project is a "high-risk-high reward" operation aimed at providing low cost non-carbon renewable energy.

Components

Component Name	**Cost (USD Millions)**

Component A: Construction of the Main Hydraulic Structure on the Indus River (US$1,479.7 million). This component would primarily consist of the civil works required for main dam structure on the Indus River to raise the water level and thus create energy for running the power generating turbines and generators.

Component B: Power Generation Facilities (US$1,397.8 Million). Construction of power generating facilities, two head race tunnels, two tail race tunnels, powerhouse for housing the turbines and generators and ancillary works.

Component C: Preparatory Works (US$344.8 Million). These include access roads, Karakoram Highway (KKH) relocation, construction of 132 kV transmission line from Dubair to Dasu, offices, on-site housing, and possibly access tunnel to the power house.

Component D: Transmission Line (US$350 Million). For transmission of power, a double circuit 500kV line would have to be installed from Dasu to Islamabad (via Mansehra) that can serve two phases i.e. an installed capacity of 2,160 MW. The component will also include preparation and implementation of social, and environment management plans and supervision.

Component E: Implementation of Social and Environmental Management Plans, and Glacial, Sediment River Monitoring (US$503.9 Million). This component would include Social and Resettlement Management Plan ((US$438.9 Million), Environmental Management Action Plan (US$54.5 Million), and Flood warning system, watershed, sediment and river monitoring (US$10.5 million).

Component F: Construction Supervision, Monitoring and Evaluation of the Project Impacts and Social and Environmental Management Plans (US$99.1 million).

Component G: Project Management Support, Capacity Building of WAPDA, Technical Assistance and Training and Future Project Preparation and Strategic Studies (US$72.4 million).

Institutional Data

Sector Board

Energy and Mining

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	Hydropower	90	90	
Water, sanitation and flood protection	General water, sanitation and flood protection sector	10	10	
Total		100		

☐ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Economic management	Other economic management	67
Environment and natural resources management	Water resource management	33
Total		100

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ] No [N]
Does the project require any waivers of Bank policies? Currently under OP14.25 Partial Credit Guarantees (PCGs) are only available for IBRD countries. While the new OP10.0 will allow for the issuance of PCGs in IDA countries, this new OP10.0 replacing OP14.25 will only come into effect on July 1, 2014, after approval from the Board of Executive Directors has been sought for this Project. Therefore under this Project a Waiver will be required from the Board to avail such a Guarantee under OP14.25.	Yes [Y] No [ ]
Have these been approved by Bank management?	Yes [Y] No []
Is approval for any policy waiver sought from the Board?	Yes [Y] No [ ]
Does the project meet the Regional criteria for readiness for implementation?	Yes [Y] No [ ]

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	Y	
Natural Habitats OP/BP 4.04	Y	
Forests OP/BP 4.36	Y	
Pest Management OP 4.09		No
Physical Cultural Resources OP/BP 4.11	Y	
Indigenous Peoples OP/BP 4.10		No
Involuntary Resettlement OP/BP 4.12	Y	
Safety of Dams OP/BP 4.37	Y	
Projects on International Waterways OP/BP 7.50	Y	
Projects in Disputed Areas OP/BP 7.60		No

Legal Covenants	
Name	**Due Date/Frequency**
Government of Pakistan (GoP) to maintain a project steering committee (PSC) with composition satisfactory to the Bank	Throughout Project implementation period.
Water and Power Development Authority (WAPDA) will maintain the Project Management Unit (PMU), an independent panel of experts (IPOE), and construction supervision consultants (CSCs), with terms of reference (TORs), composition, staffing and qualification acceptable to the Bank. WAPDA shall minimize or avoid the turn-over of staff and consultants	Throughout Project implementation period
National Transmission and Distribution Company (NTDC) would maintain its PMU with terms of reference, composition and staffing acceptable to the Bank. NTDC shall minimize or avoid the turn-over of staff and consultants	Throughout Project implementation period
WAPDA would ensure that the environmental and social unit of the PMU is fully staffed and its work plan is finalized.	Within three months of the effectiveness, thereafter, throughout the project period
WAPDA will engage and thereafter maintain, Project management, monitoring and evaluation consultants, under TORs and contractual arrangements satisfactory to the Bank.	Within six months after effectiveness (then throughout Project implementation)
NTDC will engage and thereafter maintain, Project design and construction supervision consultants, under TORs and contractual arrangements satisfactory to the Bank.	Within six months after effectiveness (then throughout Project implementation)
GoP to ensure that WAPDA and NTDC implement the Project in accordance with the GAAP	Throughout Project implementation period.
WAPDA and NTDC will prepare annual work plans and budgets for each year of Project implementation	By October 31 or each year.
GoP would ensure that the WAPDA will implement the agreed Environmental Management Plan (EMP) and the Social and the	Throughout Project implementation period

Resettlement Management Plan (SRMP), and these plans would be updated time to time as agreed by the Bank.	
GoP would ensure that NTDC would develop designs of the transmission line according to the acceptable international standards and prepare and implement an environmental management plan and a resettlement action plan (RAP), according to the agreed Environmental Assessment and Review Framework (EARF) and Land Acquisition Resettlement Framework (LARF).	Prior to inviting bid or undertaking preparatory works for the respective activities (then throughout Project implementation)
WAPDA and NTDC to ensure, prior to commencing any civil works: (i) all necessary governmental permits and clearances; (ii) compliance with all pre-constructions requirements; (iii) resettlement of affected person and prior and full payment of compensation; and (iv) obligation of contractor to comply with the applicable safeguard documents.	Throughout Project implementation period.
WAPDA to ensure that TORs for consultants services for capacity building activities under sub-components G.2 and G.3 (engineering, operation and maintenance of dams and strategic studies for pilots and future investments), shall comply with the Bank's environmental and safeguard policy standards. TORs to be cleared with the Bank.	Throughout Project implementation period.
WADPA and NTDC to maintain in their websites an updated list of displaced persons on account of Project implementation, publicly disclosing their identities and the compensation entitlements and amounts paid to them.	Throughout Project implementation period
WAPDA and NTDC would establish and maintain on-site a Grievance Redress Committees (GRCs) throughout the Project implementation period with TORs and composition satisfactory to the Bank.	One and six months after effectiveness for WAPDA and NTDC respectively
WAPDA to prepare detailed emergency preparedness plan (EPP) and O&M Plan (OMP) for the operation of DHP prior to the impoundment of the reservoir	Twelve months prior to impoundment for the EPP and six months for the OMP
GoP to cause NTDC (or the entity acting as Central Power Purchase Agency) to maintain the Escrow Account opened under Tarbela IV with a balance of reserves equivalent to a period of billing by WAPDA to said entity (not to exceed two months). GoP will ensure the availability of funds for the capitalization of that Escrow Account. .	Throughout project period and thereafter.
Payments of USD50,000 or more out of IDA financing for land acquisition, compensation of properties and resettlement and rehabilitation will: (a) require the Bank's prior review and approval; (b) have an overall ceiling of USD111 million equivalent; and (c) be eligible for financing if made within 24 months as of the effectiveness of the credit.	First twenty four months as of the effectiveness of the Credit
Conditions and covenants for IDA Partial Credit Guarantee for commercial financing would be agreed when the guarantee related agreements are finalized with the Islamic Republic of Pakistan, WAPDA and financiers.	By Guarantee Effectiveness and throughout project implementation

Conditions	
Name	**Type**
GoP shall on-lend the proceeds of the IDA Credit to WAPDA and NTDC under a	Effectiveness

subsidiary agreements to be entered into among the GoP, WAPDA, and NTDC, under terms and conditions approved by the Bank, which should include inter alia that: (i) WAPDA and NTDC would be authorized to withdraw proceeds of the Credit and proceeds withdrawn by WAPDA and NTDC would be considered withdrawn by GoP; and (ii) The proceeds of the Credit shall be re-lent to WAPDA and NTDC on the same terms and conditions of the Credit and at the maximum interest rate of 15 percent.	
IDA funds for land acquisition, compensation for properties and resettlement and rehabilitation would be disbursed after: (i) WADPA/NTDC have prepared and approved the Standard Procedures for Compensation Payments in a manner and substance satisfactory to the Association; and (ii) the final rate(s)/price(s) to be paid to Displaced Persons on account of Land Acquisition and Resettlement Compensations have been: (a) determined in a manner and substance satisfactory to the Association; (b) formally endorsed by Ministry of Water and Power and the Ministry of Finance, and (c) publically announced along with the process of determination.	Disbursement.

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Masood Ahmad	Lead Water Resources Specialist	Team Lead	SASDA
Chaohua Zhang	Lead Social Development Specialist	Soc Dev and Resettlement	SASDS
Mohammad Saqib	Senior Energy Specialist	Energy, financial analysis	SASDE
Robert Schlotterer	Senior Infrastructure Finance Specialist	Infrastructure Finance	TWIFS
Javaid Afzal	Senior Environmental Specialist	Environment	SASDI
L. Panneer Selvam	Lead Environment Specialist	Environment	SASDI
Leanne Farrell	Environment Specialist	Environment	SASDI
Uzma Sadaf	Senior Procurement Specialist	Procurement	SARPS
Waseem Abbas Kazmi	Financial Management Specialist	Financial Management	SARFM
Tomoyuki Yamashita	Senior Energy Specialist	Energy, Transmission	SASDE
Anwar Ali Bhatti	Financial Analyst	Disbursements	SACPK
Leiping Wang	Lead Energy Specialist	Energy Sector Lead	SASDE
Satoru Ueda	Lead Dam Specialist	Dams, infrastructure	TWIWA
Anna C. O'Donnell	Social Development Specialist	Social Development	SASDS
Mark Walker	Chief Counsel	Lead Guarantees Lawyer	LEGSO
Patrice C. Caporossi	Senior Infrastructure Finance Specialist	Infrastructure Finance	TWIFS
Arnaud Braud	Young Professional	Infrastructure Finance	TWIFS
Chau-Ching Shen	Senior Loan officer	Disbursement	
Martin Serrano	Senior Counsel	Legal	LEGES
Jan Erik Nora	Operations Officer	Project Operations	SACRI
Shahzad Sharjeel	Senior Communications Officer	Communications	SAREX
Shabir Ahmad	Senior Program Assistant	Program Support	SASDO
Venkatakrishnan Ramachandran	Program Assistant	Program Support	SASDO
Kimberly Lyon	Junior Professional Associate	Operations Analyst	TWIWA

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Pakistan	Khyber Pakhtunkhwa Hazara Division	Upper Kohistan District, 8 Km from Dasu Town the Capital of Upper Kohistan District			

I. STRATEGIC CONTEXT

A. Country Context

1. Pakistan has important strategic endowments and development potential. The country is located at the crossroads of South Asia, Central Asia, China and the Middle East, and is thus at the fulcrum of a regional market with a vast population, large and diverse resources, and untapped potential for trade. Pakistan faces significant economic, governance and security challenges to achieve durable development outcomes. The persistence of conflict in the border areas and security challenges throughout the country is a reality that affects all aspects of life in Pakistan and impedes development. The18th Constitutional Amendment passed by the National Assembly on April 8, 2010, enhanced provincial autonomy and reshaped federal–provincial relations while the 7th National Finance Commission (NFC) Award of 2010 shifted greater funding to the provinces. The elections of May 2013 heralded the first democratic-to-democratic transfer of power in the country's history and delivered a mandate to the government to address the "four Es": extremism, energy, economy and education.

2. ***Growth over the past five years has been weak***. Recovery from the 2008–09 global financial crises has been the weakest in South Asia, with GDP growth averaging 2.9 percent between fiscal years 2008/2009 (FY08/09) and FY 12/13, about half the FY03/04 to 06/07 rate. Fiscal deficits of 6 percent or more prevailed for four years in a row, and the deficit of 8.5 percent of GDP for FY11/12 was the second highest ever. These deficits stem largely from high and untargeted power subsidies and from poor tax collection. Financing the deficit has crowded out private sector credit, dampening growth further. External accounts and reserves have also been under pressure. The country aims to achieve 6–7 percent growth and cut inflation to 7 percent. Key measures under the IMF Extended Fund Facility (EFF), include rebuilding reserves and ensuring fiscal consolidation (2 percent of GDP). Working closely with international financial institutions including the IMF, Asian Development Bank, several bilateral donors and the Bank, the government has set out a program of structural reforms, particularly in energy, taxes and state owned enterprises to secure a positive response from private investors and lower Pakistan's future reliance on foreign aid.

3. ***Pakistan has made considerable progress in reducing absolute poverty and improving shared prosperity over the last two decades.*** Between 1991 and 2011 (latest available data), the proportion of people with an income of less than $1.25 a day was more than halved, led by rural areas. The percentage of the population below the national poverty rate has fallen from 34.7 percent in FY01/02 to an estimated 13.6 percent in FY10/11. Real per capita consumption growth of the bottom 40 percent of the population – a measure of shared prosperity – also exceeded that of the top 60 percent in the same period. Growth has been broadly inclusive, with the national Gini coefficient falling from 0.34 to 0.29 between FY98/99 and FY10/11. Social safety nets such as the Benazir Income Support Program (BISP) have redistributed wealth to the poor and vulnerable and have become especially important as growth has become more volatile.

4. ***Encouraging preliminary data from the first semester of FY14 suggest the economy is about to turn.*** Growth seems to be picking up, driven mainly by services and manufacturing. Foreign direct investments also grew by 18 percent during July, 2013-February, 2014. Notably, reserves have recovered somewhat from their lows. If recovery and reforms continue, reserves may pick up and are projected to reach 1.8 months of imports by end FY14. Inflation was in double digits at end-FY11/12, but appears containable at 10 percent as the economy strengthens. Growth is expected to climb gradually. The fiscal deficit (excluding grants) is projected to decline to 4.4 percent of GDP by 2017/18. The cornerstone is an expected improvement in tax revenue by about three percentage points of GDP and reduction of current expenditures by about two percentage points of GDP, mainly due to lower electricity subsidies. Total public debt (including IMF obligations) is projected to fall to around 58 percent of GDP by FY17/18. Unfolding privatization plans and other economic measures introduced by the government are expected to

attract foreign direct investments and financial inflows. Foreign exchange reserves are projected to improve to close to three months of import coverage in FY17/18.

5. ***Pakistan's energy sector is facing a serious crisis, especially in electricity.*** Based on preliminary estimates, the poorly performing electricity sector is thought to have reduced GDP growth by 2 percent per annum for the past several years while subsidies and unpaid bills amount to nearly six percent of GDP. A combination of inadequate investment in the sector over many years, heavy subsidies to end users, a high cost base, poor operational performance by sector entities, incomplete reforms and government interference has resulted in a system that verges on collapse. The new government elected in May 2013, was chosen partly on the basis of its promise to fix the power sector through a combination of structural reform and improved management.

B. Sectoral and Institutional Context

6. As of June 2013, Pakistan's nominal installed capacity, including that operated by publicly-owned Generation Companies, (Gencos), WAPDA Hydel, K-Electric (formerly the Karachi Electricity Supply Company) and IPPs amounted to 23,663MW, little changed over the past several years. Of that installed capacity, an estimated 14,000-14,500MW is available for generation on a typical summer day and about 11,500-12,000MW in winter. This must be compared with peak demand for a summer weekday, which is close to 21,000MW and for a winter weekday about 14,000MW. The shortfall in generation results in load shedding of about 6-8 hours a day in the summer, and sometimes as much as 20 hours.

7. At 449 kilowatt-hours (kWh), annual per capita electricity consumption in Pakistan is lower than the average for lower middle income countries, at 734 kWh per person per year in 2011.[1] Consumption has grown more slowly in Pakistan than among its peers; since 1990 it has grown by only about 67 percent. Neighboring countries in South Asia such as Bangladesh, India, Nepal and Sri Lanka witnessed a growth in electrical consumption by about 441, 187, 154 and 218 percent respectively while Malaysia grew by 271 percent and China by 546 percent over the same period. The proportion of people with access to grid electricity in 2011 was estimated to be 69 percent, which compared poorly with India and Nepal at 75 and 76 percent respectively but is somewhat better than Bangladesh at 60 percent. Malaysia and China are over 99 percent electrified[2]. The electric power faces four challenges in the sector:

- Tariff revenues do not cover costs, resulting in high levels of subsidy being paid by government to the power distribution sector. In Fiscal Year 2012-2013 (FY12/13) government paid some PKR 349 billion in subsidies or some 1.75 percent of GDP. Costs that cannot be recovered from consumers or the government accumulate on the books of the public electricity distribution companies (Discos). The Discos in turn fail to pay fully for goods and services they receive, especially electricity, thus spreading the shortfall throughout the supply chain. Commonly called the circular debt, these accumulated arrears amounted to about four percent of GDP in FY12/13.
- Costs are high and difficult to control, because of a heavy dependence on imported oil for generation. Of the total of 86 Terawatt hours (TWh) of electricity generated in Pakistan in FY04/05, domestic gas was used for about 50 percent, oil accounted for 16 percent and hydro the balance of about 34 percent. In FY12/13, gas accounted for 27 percent, oil for 36 percent and hydro for 30 percent of the 99 TWh generated.
- There has been inadequate investment in low-cost baseload generation capacity. From 2000-2008 there was almost no investment in generation and from 2009 to June 30, 2013 there was a net increase in capacity of just 3,000 MW against a backdrop of demand growth of about seven percent a year. By comparison, installed capacity increased by 40 percent in Bangladesh, and 46 percent in India over

[1] *World Development Indicators.* Annual per capita consumption is 4,246 kWh for Malaysia and 3,298 kWh for China.
[2] *World Development Indicators.*

the same period. From a peak of 26 percent of total investment and 51 percent of public investment in the mid-1990s, the share of energy (including power) investments had declined to 4 percent and 26 percent, respectively, by FY09/10. Private investment in the sector was essentially zero over the same period.

- To date, sector reform efforts have been largely unsuccessful, mainly the result of ineffective implementation and weak governance as well as a want of political will.

Strategies to Address the Challenge

8. **Pakistan's goal is to develop an efficient and consumer oriented electric power system that meets the needs of its people and economy sustainably and affordably**. The three guiding principles of the 2013 National Power Policy are efficiency, competition and sustainability, and it focuses on five main targets set out in Table 1.

Table 1: The Five Main Targets of the National Power Policy (July 2013)

Target	Current Situation	Goal and date
Decrease gap between supply and demand	4,500 – 5,000 MW shortfall	Reduce to zero by 2017
Improve affordability by decreasing cost of generation	Average generation cost 12 US¢/kWh	Reduce average generation cost to 10 US¢/kWh by 2017
Decrease aggregate technical and commercial transmission and distribution (T&D) losses	T&D losses currently about 23-25 percent	Reduce T&D losses to about 16 percent by 2017
Improve collection of billed electricity	Collections are currently about 85 percent of billing	Increase collections to 95 percent of billing
Improve governance by decreasing decision making times at Ministries, related departments and regulators	Slow decision making	Shorter processing times (goal yet to be established)

9. **The government has developed an Action Plan to implement the National Power Policy over the next 3 to 5 years**. The action plan ties together the policies and actions required to implement the specific strategies of the 2013 National Power Policy. The strategies are closely interlinked. Achieving financial sustainability requires improving cash flows through tariffs reflective of efficient costs, promoting efficiency and performance of the companies through commercialization, and reducing losses, in particular theft. Reductions in the cost of generation will come from increasing hydropower and gas in the generation mix and better efficiency, promoted through least cost planning. Subsidies must increasingly be targeted only to low-income households. Creating awareness and consensus for the policy implementation requires increasing transparency through greater access to information, strengthening the capacity of NEPRA and improving its accountability.

10. **The donor community is strongly supporting the structural reform of the power sector**. The IMF has agreed to a 36 month EFF in the amount of US$6.68 billion. The Fund-supported program includes reforms to the power sector. The program was approved in August 2013 and the second review was satisfactorily concluded on March 24, 2014 and a disbursement of $555.6 million approved. The Bank's Power Sector Reform Development Policy Credit Series, the first of which has been approved by the Board on May 1, supports the reforms and has been developed in collaboration with Asian Development Bank (ADB) and Japan International Cooperation Agency (JICA). It reinforces the IMF reforms particularly relating to subsidy and tariff reform, further development of the market and improving transparency and accountability.

11. **Support is also needed on the investment side**. The National Power Policy goals to reduce generation cost and close the gap between supply and demand will require additional generation capacity to be built. In 2011, National Transmission and Dispatch Company (NTDC) prepared a least cost power system expansion plan for FY11/12 to FY29/30 for generation and transmission. All candidate investments were considered, including hydropower, thermal generation, regional power trade, and energy efficiency programs. Expansion of hydropower generation is fundamental to addressing Pakistan's long-term power needs, particularly through the development of the Indus Cascade, which would use the same water to produce electricity several times (see Map IBRD 40383 attached of Indus Cascade). The generation mix will begin to shift in favor of hydropower only after large projects of the Indus Cascade are developed, bringing some 12,000 MW of new capacity and over 72,000 GWh of energy over next 12-20 years. Development of the Indus cascade – with DHP-1 as the first of the remaining projects – is demonstrated to be on the least cost generation path. The expansion plan also notes that complementary investment in thermal generation – to allow a balanced hydro-thermal system to be developed – would also be required, in coal and gas-fired generation[3]. An estimated US$60-70 billion of investment will be required to meet the electricity deficit in the country.

12. **Mobilizing Commercial Capital for Power Generation projects**. Meeting the huge investment needs in the power sector will not be possible without private sector participation. Pakistan has been successful in securing commercial financing for large thermal power projects in the past. The World Bank and IFC also supported those efforts by mobilizing private debt financing for large generation projects. One of the Bank's former engagements supported the financing (through an IBRD PRG) of the 1,200MW thermal power project implemented by Hub Power Company Limited. Another successful project supported with World Bank Guarantees and IFC loans was the 586 MW Uch Power Station. The Government recognizes that to attract more private sector investment it must address perceptions of political and other risks and rebuild confidence that investors will be repaid. A combination of a revitalized, financially sustainable and reformed power sector and technically and financially sound investments is needed.

13. **The World Bank Group (WBG) has embarked upon a "Transformational Power Initiative",** to support significant new investments and reforms in the power sector. The program aims to mobilize over $10 billion to support new generation in a mix of public and private projects that address current supply gaps and future needs. The program will also support significant reforms for enhancing the financial viability of the sector. The objectives pursued under this program include: significant reduction in load-shedding; reduction in energy production costs; and improve sustainability of the energy sector. The program comprises the ongoing and new WBG initiatives. Ongoing energy projects include : (i) Tarbela fourth extension adding 1410 MW of hydropower (IBRD and IDA financing) and Natural Gas Efficiency Project to reduce technical and commercial gas losses; (ii) IFC has been supporting low cost generation using indigenous gas and hydro resources as well as promoting alternative sources (wind). IFC's current portfolio comprises: two private sector hydro projects- Laraib (84MW) & Star Hydro (147MW); one private power based on indigenous gas- Uch-II (404 MW); two wind projects- Zorlu (50MW); and Metro (50MW); and a waste to energy- KOEL (25MW). In addition, IFC has financed about 800MW of electricity generation for the first privatized integrated electricity utility (K-Electric). MIGA is also already actively engaged in Pakistan's power sector. Since 2012 MIGA is supporting Korea Water Resources Corporation (K-Water) and Daewoo Engineering & Construction (Daewoo) in Star Hydro Power Limited incorporated with a US$148.5 million MIGA Insurance.

14. New Energy reform program and investments include: (i) a series of Power Sector Reform Development Policy Credits (DPCs) with parallel financing by the ADB and JICA (the first DPC is was

[3] The World Bank does not anticipate financing any coal-fired generation. In line with the 2013 Energy Directions Paper, the World Bank Group will finance coal-fired generation only in rare circumstances, but supports a long term approach to sector-wide planning to help secure adequate, reliable and sustainable energy supply.

approved by the Board on May 1, 2014); (ii) proposed DHP-I adding some 2,160 MW of clean hydropower is a public sector project. For this latter project, which is the subject for approval under this PAD, it is proposed to combine the use of conventional IDA credit financing with World Bank Guarantees, which may also be complemented by MIGA insurance products during implementation. IFC may later consider mobilizing financing for some components such as the transmission line; (iii) IFC is engaging with local and international sponsors (including Chinese and South Korean utilities), to finance private energy projects, including hydro, thermal, and renewables. As part of its engagement with China Three Gorges, IFC is expected to mobilize substantial equity investment with international investors for the establishment of a platform company (China South Asia Investments Limited – CSAIL) to develop hydro, solar and wind power over the next five years. These efforts will leverage and mobilize significant capital to support the large pipeline of power projects in Pakistan; (iv) IDA and IFC are coordinating in bringing Central Asia power to Pakistan through Afghanistan (CASA-1000). IDA is also supporting a feasibility study for an India / Pakistan transmission line.

15. **The proposed DHP-I is an important element of the government's strategy** to restore Pakistan's energy sector to a role that will effectively support long term economic growth. It is a strategic investment that: (i) enables a structural shift to a low cost, low carbon fuel mix that improves energy security; (ii) reduces the cost of electricity generation ranging between 7 to 19 percent depending upon assumptions; (iii) reduces the sector deficit by injecting positive cash flow and saving foreign exchange for the Government of Pakistan by displacing imported fuel; and (iv) builds the broader institutional capacity of WAPDA to harness the hydropower potential of the country in a sustainable manner, in particular the development of the Indus Cascade; and (v) provides a financing and investment model that can be followed for other hydropower projects in Pakistan.

C. Rationale for Bank Involvement

16. The Bank has a long history of partnership with Pakistan in the energy and hydropower sectors. As a key partner and principal donor, it has provided support to several main interventions in the development of the Indus Basin System, including: (i) facilitating the Indus Waters Treaty negotiations between Pakistan and India in the 1950s; and (ii) establishing the Indus Basin Development Fund that supported the construction of the Mangla and Tarbela Dams and several inter-river link canals and barrages that enabled the implementation of the Treaty. More recently it has supported the 1,450MW Ghazi Barotha hydropower project, which entered service in 2004 and the 1,410MW Tarbela Fourth Extension hydropower project currently under implementation. The Bank's continued engagement with Pakistan in hydropower will support the government in addressing one of its highest priorities.

17. From the Bank perspective, the Pakistan program is also important in delivering on its commitments to help clients reduce their carbon footprint and make electric power generation more sustainable. The proposed project is a strategic investment and is an important part of the transformational energy initiative for Pakistan, in which the support from across the Bank Group is focused on helping Pakistan's energy sector out of its crisis and onto a more sustainable path that supports economic growth. Under the initiative, the Bank, with its deep experience and longstanding engagement in the hydropower sector has a comparative advantage in dealing with the publicly-financed aspects of the initiative, and complements IFC and MIGA's private-led approach.

18. DHP-I also sets the stage for a renewed Bank relationship with WAPDA Hydel, the agency in charge of development of hydropower resources in Pakistan, and a long-term partner of the Bank that has demonstrated a good track record of performance. Going forward, a long-term strategic engagement with WAPDA Hydel, with significant institutional strengthening measures built into this Project design, is an important pillar of the overall Bank strategy for the energy sector in Pakistan. It will assist WAPDA Hydel in integrating international technical, environmental and social best practices in its institutional capacity as it seeks to prepare to develop a portfolio of large hydropower projects of the Indus Cascade. A

strengthened WAPDA Hydel would buttress the sector and reform program, and help pull the sector out of the current crisis.

D. Higher Level Objectives to which the Project Contributes

19. The Project underpins key objectives of the current (FY10-14) and future (FY15-19) Country Partnership Strategies (CPS). In the current CPS (Report No. 53553-PK), it underpins primarily Pillar 3 (Improving Infrastructure to Support Growth) by adding low cost electricity to the system, reducing the country's dependence on imported fuel oil and reducing the fiscal deficit of the energy sector and the country. And in the future CPS, it supports all four result areas: (i) "Energy," currently a critical source of macro-imbalances in the country; (ii) "Private sector development," by reducing power shortage, rated as major obstacle in doing business, through the provision of low-cost, reliable baseload energy; (iii) "Inclusion" by sharing the project benefits with the communities in the project area through community and other social development schemes; and (iv) "Service Delivery" by expanding access to basic services to these communities. In addition, the project will have climate change benefits through the abatement of greenhouse gas (GHG) emissions by developing a renewable energy supply.

II. Project Development Objectives/Global Environmental Objectives

A. PDO

20. The overall project development objective is to facilitate the expansion of electricity supply of hydro-power in Pakistan. The Project would also improve access to socio-economic services for local communities in the project area and build WAPDA's capacity to prepare future hydropower projects. This would be achieved by installing a 2,160 MW hydropower plant on the main Indus River, which can be expanded to 4,320 MW in future at very low cost. The Project is a "high-risk-high reward" operation aimed at providing low cost non-carbon renewable energy.

B. Global Environmental Objectives (GEOs)

21. The project would contribute significantly to the overall GEOs of reducing emissions of greenhouse gases over the life of the project by providing electricity from non-carbon renewable source rather than thermal fuels. In the absence of this project the most suitable electricity generation would be from combined cycle gas turbine (CCGT). It is estimated that the proposed project would result in net reduction of 223.4 million tons of CO_2. The reservoir emissions are estimated at around 0.073 tCO_2 as most of the land in the reservoir area is barren without any vegetation and flows are very high in the river and the project is run-of-the-river. The emissions for construction activities is estimated about 2.11 milliontCO_2 including energy use in construction on-site and off-site emissions embodied in construction materials. The baseline generation emission (CCGT) is estimated at around 224.67 million tCO_2 and emission from construction of baseline CCGT would be 0.83 tCO_2. The detailed estimates are provided in Annex 8. The emission reduction would be higher considering the current fuel mix of the country which is overwhelmingly dominated by fossil fuels (furnace oil: 36%, natural gas: 29%).

C. Project Beneficiaries

22. The Project would provide benefits to most sectors of the economy in Pakistan, and the population as a whole would benefit directly or indirectly. The direct beneficiaries would be the millions of energy users, including industry, households and farmers who would get more electricity at lower cost and suffer fewer blackouts. The Project would provide more electricity during the summer months when capacity shortages are most severe, and thus benefit all electricity users. The non-electric users would benefit indirectly because of higher productivity and employment, particularly in the industrial sector. At the same time, the project will contribute to the socioeconomic development of the communities in the project area. Local populations are expected to benefit from employment opportunities during the project

construction phase as well as improvement of local infrastructure, public services and long-term livelihood support interventions planned under the project.

23. **The reduced price of electricity will reduce poverty slightly in the short run, but resulting expansions in access and reliable supply would strengthen the effect on poverty reduction.** The additional electricity supply from the project would improve reliability and reduce load shedding resulting in increased growth and employment. It would thus have major impact on poverty reduction. Simulations from a Computable General Equilibrium model linked to household data suggest that an 8 to 19 percent reduction in electricity prices would lead to a reduction in headcount poverty of between 0.1 and 0.25 percentage points. In the model, poverty would fall due to poor households' increased purchasing power as well as reduced inflation. The model likely underestimates the beneficial effect on poverty, however, because it assumes that access to electricity remains unchanged. Access is a serious issue for the poor. Of the bottom 40 percent of the population, 12 percent do not use electricity for lighting. Furthermore, there is strong evidence from other developing countries that access to quality electricity improves industry productivity, encourages economic activity (especially among women) and reduces poverty.[4]

D. PDO Level Results Indicators

24. Progress towards achieving the development objective will be measured through the following key performance indicators:

- Electricity supply of about 12,000 GWh of renewable energy annually to the central grid;
- Number of additional people in the project area provided with improved socio-economic services;
- Number of large hydropower projects on the Indus River prepared by WAPDA.

III. PROJECT DESCRIPTION

25. **Phased Approach to Development of the Project.** The proposed Dasu Hydropower Project (DHP) is a run-of-river project located on the Indus River about 240 km upstream from the Tarbela dam. It is about 8 km from Dasu town (capital of upper Kohistan District of Khyber Pakhtunkhwa Province (KPK)) and 350 km from Islamabad. The total size of the project is 4,320 MW. Due to capital constraints faced by GoP and WAPDA, it proposed to develop the project in two stages, with each stage further divided into two phases of 1,080 MW each. Under the DHP Stage I (DHP-I), the two phases of 1,080 MW each would be developed simultaneously to provide 2,160 MW capacity. The schedule would ensure to urgently bring the first generating unit online. The first phase of Stage I, at a cost of US$3,650 million, will contain the majority of the infrastructure, site preparation and social and environmental safeguards for the whole project. The high upfront cost for Phase I is offset by the relatively high generation, which despite the front-loading of main infrastructure and other social and environmental management costs, gives a good economic return of more than 21% (excluding environmental benefits). The generation from Phase I is over 8,000 GWh, as sufficient water flows are available in the river throughout the year to run this plant, resulting in a very high plant factor of over 85 percent, which is exceptional for a hydro project. The cost of Phase II is quite low (about US$600 million) but will increase the installed capacity to 2,160 MW and annual generation to about 12,225 GWh with a plant factor of over 65%, which is still very high. The cost per unit would be even lower, increasing the ERR to 25%.

26. **Phased Financing for Phased Construction.** The proposed implementation of the project through phased construction also lends itself to phased securing of its financing. Financing large hydropower plants (HPPs) is complex. High capital costs and long construction times are key challenges. As a consequence, many large HPPs in the world are financed in a sequenced manner. Section B below and Annex 2B provide further details on the proposed phased development of the DHP, along with costs,

[4] See Lipscomb, et al (2013), Dinkelman (2012), Rud (2011), Chakravort, et al (2012), and Van de Walle, et al (2013).

financing and returns from each Stage/Phase, as well as the overall project when fully developed. The DHP-I is transformational as it will reduce the cost of generation and foreign exchange expenditures for the country, and provide a model for financing the country's hydropower program.

27. **Power Density.** In addition to generating substantial benefits to the economy, the proposed DHP-I has a uniquely limited footprint when compared to similar large hydropower projects in the world. Table 2 compares the power densities of the world's largest dams with DHP. The power density, measured in watts/m^2 of the reservoir area is increasingly used as an indicative measure of the social and environmental impact of a hydropower project as well as a proxy for its GHG efficiency. Its location in a narrow gorge and steep slope of the river bed and very high water flows gives an unusually high power density of 181 MW/km^2 (or W/m^2). Even with DHP-I only, the power density is 91 MW/km^2, more than four times the power density of the next best examples, i.e. the Three Gorges and Grand Culee projects, which are around 21 MW/km^2.

Table 2: Power Densities of World's Largest Hydropower Dams

	Hydropower Project	Country	River	Installed Capacity (MW)	Reservoir Area (km^2)	Power Density (MW/km^2 or W/m^2)
1	Three Gorges	PRC	Yangtze	22,500	1,045	21.53
2	Itaipu	Brazil	Paraná	14,000	1,350	10.37
3	Guri	Venezuela	Caroní	10,200	4,250	2.40
4	Tucuruí	Brazil	Tocantins	8,370	3,014	2.78
5	Grand Coulee	USA	Columbia	6,809	324	21.02
6	Krasnoyarskaya	Russia	Yenisei	6,000	2,000	3.00
7	Robert-Bourassa	Canada	La Grande	5,616	2,835	1.98
8	Churchill Falls	Canada	Churchill	5,428	6,988	0.78
9	Bratskaya	Russia	Angara	4,500	5,470	0.82
10	Trung Son	Vietnam	Ma	260	13.1	19.8
11	Sera da Mesa	Brazil	Tocantis	1,275	1784	0.7
12	Nam Theun 2	Laos	Nam Theun	1,070	450	2.38
13	**Dasu Stage I and II**	**Pakistan**	**Indus**	**4,320**	**24**	**181.20**
	Dasu Stage I	**Pakistan**	**Indus**	**2,160**	**24**	**90.6**

Source: Marco Aurélio dos Santos *et al*., *Variability of Greenhouse Gas Fluxes from Hydropower Reservoirs in Brazil*, UNESCO Workshop on Freshwater Reservoirs and GHG emissions, Paris, November 2006; Vietnam projects from World Bank, Trung Son Project Appraisal Document, Hanoi, 2010. And information collected from Wikipedia

A. Project Components

28. The Project consists of the following components (see Annex 2A for more details). The IDA amounts correspond to the credit proposed for US$588.4 million.

29. **Component A: Construction of the Main Hydraulic Structure on the Indus River (US$1,479.7 million, of which IDA $10.0 million).** This component would primarily consist of the civil works required for the main dam structure on the Indus River to raise the water level and thus create energy for running the power generating turbines and generators. The spillway structure would be built in the main hydraulic structure to pass the floods. Nine, Low Level Outlets (LLO) will be built in the main structure and two flushing tunnels on the right bank to flush the sediment coming from upstream that may be deposited in the reservoir. The main dam structure would be constructed with Roller Compacted Concrete (RCC).

30. **Component B: Power Generation Facilities (US$1,397.8 Million).** As indicated above the power generation facilities would be developed in two stages and four phases. Four Headrace Tunnels (HTs) would divert water from the reservoir for power generation to the Power House (PH) constructed underground. Water passing through the turbines would be discharged from the power house to the river

through four Tailrace Tunnels (TTs). Each Headrace Tunnel would supply water to three generation units of 360 MW each. There would be a total of 12 units with a total installed capacity of 4,320 MW at full development. Similarly each TT would discharge water from three generating units. The underground sub-stations would be constructed to serve the power house. The component would have two sub-components: (B1) - works for waterways for the power generation facilities that is head race tunnels, power house and tailrace tunnels and associated infrastructure such as gates and other control structures, etc.; and (B2) -- Turbines, generations, and electro-mechanical equipment etc. As indicated above under the DHP-I only two waterways i.e. two HTs, two TTs and power house would be completed and equipment would be installed for a generation capacity of 2,160 MW -- six units of 360 MW each.

31. **Component C: Preparatory Works (US$344.8 Million, of which IDA $183.9 million).** This comprises access roads, Karakoram Highway (KKH) relocation, construction of 132 kV transmission line from Dubair to Dasu, offices, on-site housing, and possibly access tunnel to the power house.

32. **Component D: Transmission Line (US$350 Million, of which IDA $15.0 million).** For transmission of power, a double circuit 500kV line would have to be installed from Dasu to Islamabad (via Mansehra) that can serve the two phases totalling 2,160 MW. The component would have three sub-components: (D1) construction of Dasu Transmission Line (DTL); (D2) preparation of detailed designs, social and environmental assessments and management plans as well as construction supervision and project management; and (D3) costs of social and environmental management plans. This component would be implemented by NTDC.

Component E: Implementation of Social and Environmental Management Plans, and Glacial, Sediment River Monitoring (US$503.9 Million, of which IDA $266.5 million).

Sub-Component E1: Social and Resettlement Management Plan ((US$438.9 Million, of which IDA $201.5 million). The Social and Resettlement Management Plan (SRMP) will include designed programs to address: (i) social dimensions of the Project, including compensation for lost assets, resettlement, and (ii) livelihood restoration and development and public health for the population affected by the proposed project infrastructure including the main hydraulic structure construction, reservoir area as well as the waterways, power house, and relocation of KKH (i.e. all infrastructure that is to be developed by WAPDA for full DHP). The SRMP will also support programs on gender and local area development in Kohistan. The cost of social interventions related to the Transmission Line is included in component D of the project to be implemented by the NTDC.

Component E2: Environmental Management Plan (US$54.5 Million). All construction-related environmental issues would be addressed in the construction contracts; thus the cost of such measures is included in the construction components. This component would include those aspects which are not or cannot be covered under the construction contracts, including measures addressing indirect and cumulative impacts, development and implementation of programs for ecological conservation, fisheries and forestry management, and costs associated with monitoring and supervision of EMP implementation.

Component E3: Flood warning system, watershed, sediment and river monitoring (US$10.5 million, of which IDA $10.5 million). Most of the water resources of the Indus River are derived from glacial melt, and the DHP is designed to withstand probable maximum floods that may be caused by glacial lake outbursts. Nevertheless, continued monitoring of catchments is crucial for the water security of the country, and useful for developing the knowledge base for the operation of the dam and for planning future hydropower investments in the Indus Basin. The component would support improved monitoring of flows and watershed improvements. It would also support sediment, river and project infrastructure monitoring program that would help in optimal operation of the project and development of further projects of the Indus Cascade.

33. **Component F: Construction Supervision, Monitoring and Evaluation of the Project Impacts and Social and Environmental Management Plans (US$99.1 million, of which IDA $53.0 million).**

Sub-component F1: Construction Supervision and Implementation Support (US$91.1 million, of which IDA $45 million). This sub-component would cover the cost of consulting and other services for Project implementation, including construction supervision and Project management support, namely the construction supervision consultants (CSCs). It would also cover implementation of all activities under the Project, including: procurement, contract administration, quality control, certification of payments, financial management, preparation of any additional designs, and bidding documents, etc.

Sub-Component F2: Monitoring and Evaluation of the Project Impacts and of Social and Environmental Management Plans (US$8.0 million, of which IDA $8.0 million). The monitoring and evaluation (M&E) activities would provide continuous feedback to the Government of Pakistan (GoP), Ministry of Water and Power (MoWP) and WAPDA on the Project's performance and impact of its various components, so that corrective actions could be undertaken in a timely manner. The component would support independent monitoring of implementation of the environment and social management plans and Project Management Support to WAPDA as owner of the project.

34. **Component G: Project Management Support, Capacity Building of WAPDA, Technical Assistance and Training and Future Project Preparation and Strategic Studies (US$72.4 million, of which IDA $60.0 million).**

G1: Project Management Support and Audits (US$42.40 million, of which IDA $30.0 million). This sub-component would support WAPDA in implementing Project-related activities, including support for operation of the PMU, capacity building, incremental staff salaries, operational cost and audits, etc.

G2. Strengthening of WAPDA, Independent Panel of Experts and Technical Assistance (US$10.0 million, of which IDA $10.0 million). This sub-component would build the capacity of WAPDA to effectively implement the Project, O&M of the dams it manages, and fully carry out its mandated functions. It would also strengthen WAPDA's capacity in developing financing plans and mobilize funding for this project, for other large water and hydropower infrastructure and other elements of the Indus Cascade.

G3. Future Project Preparation and Strategic Studies (US$20.0 million, of which IDA $20.0 million). This component would support strategic studies to address technical, financial or management issues, mitigation measures, pilot projects and preparation of future projects that may be identified during Project implementation and agreed upon with the Bank.

B. Project Cost and Financing

B.1 Project Cost

35. The total Project cost is about US$4,250 million for Stage-I which consists of two phases with a total installed capacity of 2,160 MW (1,080 MW in each phase). The bulk of this cost is for Phase-I, consisting of installation of first 1,080 MW at about US$3,650 million, as most of the works and the infrastructure would be developed under this phase. It also covers all of the costs of preparatory works, including offices and camps, as well as social and environmental costs. The cost of Phase-II for installation of the second 1,080 MW is US$600 million -- bringing the total installed capacity to 2,160 MW. Phase- II, which is expected to commence towards the end of Phase I, involves construction of a second waterway i.e. headrace and tailrace tunnels, part of the power house and installation of three power units and related electro-mechanical works. The cost estimates include physical contingencies, price contingencies based on international inflation, taxes and duties on civil works, imported machinery, including turbines and generators, etc. The cost by component for Stage I is provided in Table 3 along with financing source. Detailed costs by sub-component and Phase I and II (of Stage I) is in Annex 2A

Table 2.2, and 2.3and respectively. The first priority is to mobilize funding for Phase-I and start generation as soon as possible, while the construction of Phase-II can proceed after the first turbine under Phase I has come online.

36. Based on the financing strategy discussed in detailed in the following, a first IDA credit of US$588.4 million equivalent (SDRs 379.7 million) is proposed for project startup and an IDA partial Credit Guarantee (PCG) of US$460 million from IDA16. This would be followed by an additional financing credit of US$533.4 million and an IDA PCG additional financing of US$460 million during IDA17. Overall financing structure for the DHP-I is given in the Table 3 and details are below.

Table 3: Project Cost Summary by Components and Financing Source (US$ Millions)

				Supported by IDA Gaurantee US$460 x 2				
	Total Including Contingencies	IDA Credit (1)	WAPDA	Commercial Financing	Export Credits	AF to the IDA Credit	NTDC	Total Check
A. Main Structure	1,479.7	10.0	55.0	1,257.8	-	157.0	-	1,479.7
B. Power Generation Facilities	1,397.8	-	109.3	642.1	546.0	100.4	-	1,397.8
C. Preparatory and Other Works	344.8	183.9	160.9	-	-	-	-	344.8
D. Transmission Line (NTDC)	350.0	15.0	-	-	-	255.0	80.0	350.0
E. Implementaton of SAP and EMP, Dam Monitoring	503.9	266.5	237.4	-	-	-	-	503.9
F. Consultancies for Supervision	99.1	53.0	25.0	-	-	21.1	-	99.1
G. Project Management, TA, Training	72.4	60.0	12.4	-	-	0.0	-	72.4
Total	**4,247.7**	**588.4**	**600.0**	**1,899.9**	**546.0**	**533.4**	**80.0**	**4,247.7**

B.2 Project Financing Strategy, and Financing Plan (See Annex 2B for details)

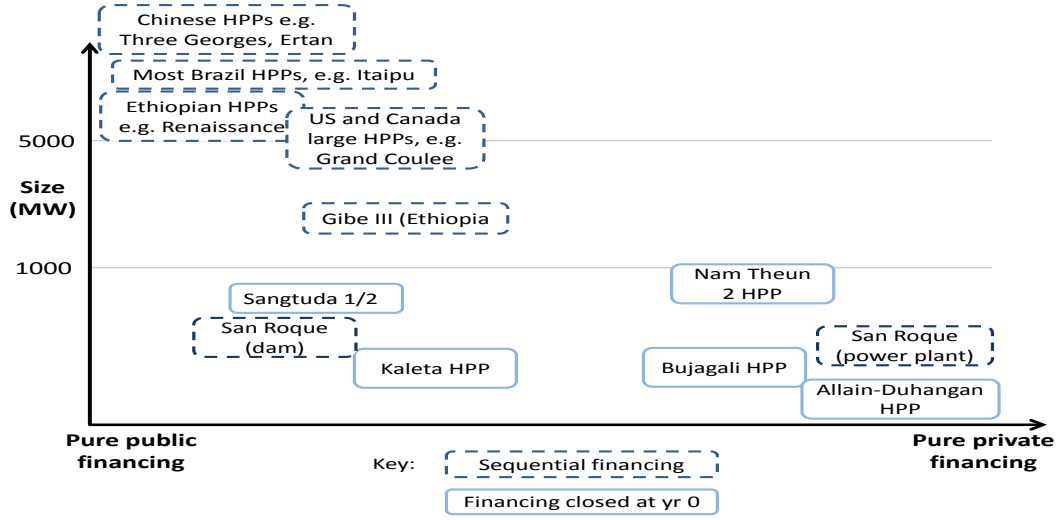
37. **Financing strategy.** The best approach for this project is to arrange the financing in a sequenced manner, in line with the sequenced construction schedule, with a mix of concessional and commercial funding sources. The risk of a potential financial shortfall due to insufficient commercial funding is to be mitigated as discussed below.

38. A **sequenced financing package approach** to fund such a large and long gestation project (DHP-I) is necessary. It is necessary because the project would not be able to raise the full US$4.2 billion plus interests during construction (IDC) given the non-availability of capital by WAPDA and/or Government of Pakistan. In addition, such sequencing is optimal for large hydropower plants as the total financing does not have to be available at the outset. In fact, many large HPPs in the world are financed in a *sequenced* manner (see Figure 1).

39. **A mix of concessional and commercial funding sources is required**. In the recent past, WAPDA relied primarily on concessional financing from bilateral and multilateral sources, supplemented with a limited amount of export credit, to finance its investment program. However, with a very large investment program planned for the next 10 years totaling some $15 billion, WAPDA needs to not only maximize the use of concessional funds, but also tap a significant amount of commercial financing from international banks/capital markets. Indeed, the magnitude of the required financing significantly exceeds the currently available funds under the World Bank Pakistan IDA lending envelope and potentially also the envelopes of other donors. As mentioned above, Pakistan has been successful in the past in securing a number of commercial loans for large hydropower projects. While the terms of the commercial finance would undoubtedly be more onerous, analysis of WAPDA's future finances indicates that these would be affordable if the current tariff regime is maintained and implemented by NEPRA. Moreover, the

additional debt service requirements in foreign exchange would be more than offset by the reduction in import of fuel oil.

Figure 1: Example of Large HPPs Financing



40. **Financing to be raised by WAPDA.** While a number of large generation projects in Pakistan were implemented entirely by the private sector, including with World Bank and IFC support, this project is proposed to be implemented by WAPDA. This structure implies that the GoP and WAPDA take the completion risk of the project. The assumption of the completion risk by WAPDA has significant advantages as it will permit a sequenced financing approach whereas implementation of the project by the private sector would require that all financing be in place at the onset of the project. In addition, WAPDA, through its corporate tariff regime, will have an important revenue stream at its corporate level available during the construction period. For those reasons, it is proposed that the financing for this project will be raised by WAPDA and further enhanced by GoP sovereign guarantees, which would be backstopped by World Bank Guarantees in the base case scenario as further described below.

41. **Proposed World Bank Financing through IDA Credits and IDA Guarantees**. Tapping international markets will still be a major challenge for WAPDA given the perceptions of country risk. However, following discussions with potential lenders, a financing strategy for DHP-I was developed with the following key elements in the Base Case financing scenario: (a) given the large investment, long implementation period and insufficient funds available, financing would be phased both to minimize the carrying cost and to reduce individual slices to manageable amounts; (b) a significant part of the commercial financing would be in the form of buyer's and/or supplier's credit; and (c) IDA Guarantees which would cover commercial lenders against debt service defaults by WAPDA under a commercial loan agreement.

42. **WBG coordination on financing strategy**. While developing this financing strategy the World Bank team has coordinated its financing approach with IFC and MIGA. IFC is supportive of the development of Dasu and values the complementarity of the World Bank engagement to its own strategy in developing future generation projects in Pakistan. The Bank team and IFC further discussed the possibility for IFC to participate in the financing of the transmission line under this project, which could be concessioned to the private sector. While the Base Case funding structure currently foresees this part of the project to be implemented by NTDC and mainly financed by an IDA concessional credit, the IFC and World Bank teams will further discuss such an alternative scenario with WAPDA, NTDC and the GoP once the implementation of the project has started. The World Bank team has also been in contact with MIGA about potential complementary insurance by MIGA. While MIGA has not yet issued NHSFO

insurance in Pakistan, the Bank team and MIGA agreed to further explore the deployment of MIGA's instruments in the context of this project.

43. Dasu will be the first hydropower project in South Asia that attempts to provide a number of IDA Guarantees and Credits in a sequenced manner to support the commercial financing of a large public hydropower generation project. The lessons learned from this operation will also help the Bank replicate similar Project designs in other countries and Bank Regions to develop large scale hydropower generation projects.

44. **Financing Plan for DHP-I.** The optimal strategy would be to finance DHP-I from a diverse range of sources. From the World Bank, the project would receive the first IDA credit of US$588.4 million initially for starting up the project works needed for development the main infrastructure and an IDA guarantee of US$460 million. Sufficient IDA funds are available in the IDA17 and IDA18 cycles that can be used to complete the project without crowding out other essential programs. In this regard, three scenarios are provided below for the base case, middle case and worst case to demonstrate that the project can be completed only with IDA assistance and funds from WAPDA and NTDC, in the event the commercial options do not materialize, without compromising other important IDA assistance programs to Pakistan (see Table 4).

(i) **Scenario A (Base Case),** assumes 85% commercial financing for main works (such as main structure on Indus River, tunnels, power house, etc.) and equipment (turbines, generators, electrical and mechanical equipment for power generation) and the remaining 15% to be financed by WAPDA/IDA. The commercial financing is proposed for about 56% of the total project cost. This is the proposed base case scenario. Under this scenario total IDA financing expected is US$2,042 million. This means during IDA17 Additional Financing (AF) of IDA Credit US$533.4 million and IDA guarantee additional financing of US$460 million would be needed. Thus the total IDA country allocation used will be US$648 million (including US$ 115 million IDA guarantee allocation) which is about 20% of the total IDA17 allocation. Details of base case financing plan are provided in Table 5 and in the Annex 2B.

Table 4: Possible Financing Scenarios for DHP-I (US$ million)

Scenario	IDA Credits		IDA Guarantees to Support Commercial Financing and EC				WAPDA	NTDC	Total
	IDA credit (IDA 16)	IDA Credit AF (IDA 17)	IDA Guarantees (IDA 16)	IDA Guarantees (IDA 17)	Commercial Financing	Export Credits			
	A	B			C	D	E	F	A to F
Scenario A (Base Case)	**588.4**	**533.4**	460	460	**1,900**	**546**	**600**	**80**	**4,248**
Scenario B	**588.4**	**1,315.7**	460	460	**1,118**	**546**	**600**	**80**	**4,248**
Scenario C	**588.4**	**2,658.1**	161		-	**321**	**600**	**80**	**4,248**

(ii) **Scenario B**, 50% commercial financing for works and 85% for equipment and the remaining to be financed by WAPDA/IDA. In this case total IDA financing would be US$2,824 million with IDA Credit AF increased to US$1,316 million. This means the IDA country allocation to be used during IDA17 would be US$1,431 million (including US$115 million IDA guarantee allocation) about 43%. In this case financing can be spread over IDA17 and IDA18; thus it would use 22% of IDA country allocation for IDA17 and IDA 18 cycles.

(iii) **Scenario C --** no commercial financing for works, only 50% commercial financial for equipment, and the remainder to be financed by WAPDA/IDA. This is the worst case scenario, with IDA financing of US$3,408 million and AF to IDA Credit increasing to US$2,658 million. This would result in IDA

country allocation of US$2,698 million (US$40 million use of IDA guarantee allocation) from IDA17 and IDA18. This is about 41% of expected IDA allocations for the next two cycles.

45. Whilst this Scenario C is unlikely to materialize and may only happen, when Pakistan's macroeconomic situation significantly deteriorates, additional measures can be taken, if necessary, to reduce the IDA share to the project. Firstly, reduction of plant size to 1,080 MW, generating over 8,000 GWh annually as compared to 12,000 GWh with a 2,160 MW plant. This would still be an economically attractive option (with ERR of 21% as compared to 25%) and reduction of cost by about US$600 million. Secondly, the transmission line could be financed by another multilateral or bilateral development partners or IFC may be able to finance it with appropriate risk mitigation measures in place as mentioned previously above. These measures would reduce IDA share of future allocations from 41% to 28% in the next two cycles. Further contribution by WAPDA can also reduce the IDA share. This would be possible as WAPDA's financial position gets better with: several ongoing hydropower plants coming on line in next few years, as WAPDA begins to get return on assets, and its escrow account builds up, as well as through reduction in sector deficits with reforms envisaged under the Power DPC and IMF program.

46. **Proposed IDA Financing.** Proposed IDA financing for the DHP-I (Base Case Scenario A) is summarized below in Table 5. This includes an IDA credit of US$588.4 and an IDA guarantee of US$460 from IDA16 as proposed under this PAD, followed by an IDA additional financing of US$533.4 million and another IDA guarantee additional financing of US$460 million to come to the Board for approval next year from IDA17. This would mean a total IDA financing support of US$2,042 million (resulting in IDA country allocation used of US$1,352 million). If there is some gap in commercial financing another IDA guarantee may be considered for equipment and machinery etc. during IDA18 cycle.

Table 5: Proposed IDA Financing Support for DHP-I and IDA Country Allocation by IDA Cycle (US$ Million)

	IDA 16 Financing Support	IDA 17 Financing Support	Total IDA Financing Support for DHP-I	Total IDA to Country Allocation Used
IDA Credit (proposed)	588.4		588.4	588.4
IDA Guarantees (proposed)	460.0		460.0	115.0
IDA Credit AF (IDA 17)		533.4	533.4	533.4
IDA Guarantees AF (IDA 17)		460.0	460.0	115.0
TOTAL	**1,048.4**	**993.4**	**2,041.8**	**1,351.8**

47. **Approach to Obtain Commercial Financing and Export Credit.** Commercial financing and export credits would be mobilized against the balance sheet of WAPDA with guarantees provided by the GoP and the World Bank, which would help to extend the maturities of these loans and credits. In preparation for the bidding for the main contracts (main structure, power tunnels and power house, and equipment and machines), would be procured through International Competitive Bidding (ICB) procedure, contractors would be made aware that they are expected to arrange these finances with the relevant commercial financiers and export credit agencies. In this case, the option for contractors to mobilize financing would be made part of the pre-qualification documents to first find out possible interest and scope. Pre-qualification (PQ) of these contracts would be done with pre-qualification conferences and the PQ may be adjusted after discussion with the interested contractors. The availability of IDA guarantees would be indicated in the PQ and bid documents –with more detail and evaluation criteria in the bidding documents. It is also planned that in parallel to the PQ conferences WAPDA and the Bank would carry out a roadshow to selective financial and equipment supplier centers to further

explain the proposed IDA PCG support and carry out further due diligence on the Guarantees structuring requirements for the Bidding Stage. All bidders and their bids would have to be technically qualified to carry out the works and supply/install equipment, with required quality, experience, safety and past performance track record and timely delivery schedules for their financing offers to be considered. Bid evaluation will be made both with and without financing, with WAPDA and GoP reserving the option of substituting some of the financing from other sources. The detailed evaluation criteria would be developed and cleared with the Bank during project implementation in particular after the market feedback during the PQ process.

48. Based on the recent experience with Tarbela involving similar construction, although the contracts were of smaller size (about US$300 million), major contractors from at least five to six countries are expected to participate in the bidding. This would make possible the mobilization of funding from several sources, and in particular, if the joint venture (JVs) partners are from more than one country, which is likely to be the case. Also, this would ensure the least cost and most competitive financing arrangements for the project.

49. **Managing Risk of Financing Shortfall.** Based on discussions with some potential lenders and suppliers of export credit, it can be expected that with a mix of export credits and IDA guarantees, financing could be mobilized on reasonable terms. Several letters of intent (LOI) have already been submitted for private financing. However, while market soundings for now have been positive, the precise terms and magnitude of commercial funding will be determined by the market conditions prevailing at the time. Should private financing be unavailable at the level anticipated, there are other potential sources of financing and many ways to help private financiers mitigate perceived risks.

50. Initial findings of the financial soundings show that alternative structuring approaches, which take into account the securitization of existing WAPDA assets, could also be considered as they would generate sufficient levels of revenue. In the past, WAPDA has managed to issue several local currency bonds, though with relatively short tenors. Through IDA Guarantee enhancement measures such bond maturities could potentially be extended. Political risks associated with the project could be mitigated, in part, with complementary MIGA insurance or a Loan Guarantee from another multilateral financing institution active in Pakistan.

51. **Approach to finalizing the World Bank Guarantees structuring**. Annex 10 provides the draft Term Sheet for the Guarantees to be supported by this Project. This Term Sheet will be the basis for the Bank to undertake (i) formal market soundings, and (ii) discussions and negotiations for the proposed IDA Guarantees. If the terms and conditions of the guarantees that are ultimately negotiated with the financiers are materially different from those that are outlined in the term sheet included in Annex 10 and that the Board of Executive Directors may approve, management will inform the Board of any such changes, before the Guarantee Agreements are signed. On the basis of the current timeline discussed with WAPDA, it is anticipated that the PQ process would be completed by the end of 2014 and the final bidding round would be launched in early 2015, thereby allowing for a financial closure of the commercial funding by mid-2015 in the base case scenario.

B.3 IDA Allocations for First IDA Credit, PCG and Required Board Waiver

52. The total IDA allocation used for this project is SDRs 454 million. Of this SDRs 74.3 million (Blend terms) are used for providing the IDA PCG and SDRs 379.7 million as a credit (US$588.4 million). SDRs 360.9 million are from cancellation of IDA funds from various projects listed below. Of the total IDA used for this operation SDRs 122.8 million are on Hard IDA terms and SRDs 331.2 million are Blend IDA terms. For the IDA credit of SDRs 379.7 (US$588.4 equivalent), SDRs122.8 million are on IDA Hard Terms and SDRs256.9 million are on IDA Blend Terms.

	SDR (million)
Kyhber Pakhtunkhwa and FATA Fmergency Recovery Project (P121394)	163.90
Social Safety Nets Development Policy Credit (P115638)	33.50
Tax Administrationo Reforms Project (P077306)	4.60
Sindh Education Sector Project (P107300)	2.60
Sindh On-Farm Water Management Project (P078997)	13.44
Electricity Distribution and Transmission Improvement Project (P095982)	15.90
Tertiary Education Support Project (P118779)	49.90
Trade amd Transport Facilitation II (P101684)	12.50
Third Partrnership for Polio Eradication Project (P114508)	0.12
Natural Gas Efficiency Project (P120589)	64.50
Total	360.90

53. **The first IDA Credit of US$588.4 million** would primarily be used for preparatory works, implementation of social and environmental management plans, and construction supervision and management. They would be used for only a small part of component A (works related to site preparation prior to mobilization of main contractor), component C (preparatory works such as relocation of KKH, access roads on the right side of the river that would be extensively used by the construction traffic, construction of a 132 KV transmission line from Dubair, construction of offices and essential residential facilities), for component D detailed design and preparation of social and environmental management plans for the 500KV transmission line to be constructed by NTDC for evacuation of power from DHP. Financing of land acquisition not exceeding US$75 million equivalent under component E1, compensation for properties, structures and, livelihood restoration and other resettlement assistance not exceeding US$36 million, under component E1 and local area development and other social development programs. Component F (construction supervision and monitoring and evaluation consultancies), and Component G (project management, incremental implementation and operating costs, training and capacity building and preparation of a future project on the Indus Cascade).

54. **Board Waiver for IDA PCG.** In addition to the IDA Credit of US$588.4 million, a IDA partial credit guarantee (PCG) of US$460 million, the approval of which is being sought under this package. This PCG would cover parts of Component A (US$1,479.7 million) and Component B (US$1,397.8 million). Board approval of a waiver of OP 14.25, *Guarantees*, paragraph 3 is sought for an IDA PCG of US$460 for commercial financing and export credits. OP 14.25, paragraph 3, currently limits IDA guarantees to only partial risk structures. It does not allow IDA to issue PCGs, such as the one proposed under the Project. On December 3, 2013, the Board approved Management's proposed reforms to fully integrate the Bank's policy on guarantees with those on investment project financing and development policy lending, in order to support a fuller use of Bank guarantees in its client countries and leverage its resources more effectively to deliver critical infrastructure.[5] Thus, the restriction contained in OP 14.25, paragraph 3, has been eliminated under the recently approved Bank/IDA's guarantee regime and a draft revised OP 10.00 on *Investment Project Financing* makes all types of guarantees available to IDA countries (under certain fiscal considerations) and eliminates the distinction between PCGs and PRGs.[6] The revised OP/BP 10.00 will come into force on July 1, 2014, after approval from the Board has been sought for this Project. Because OP 14.25 will still be effective until the end of June, Management endorses the request to the Board for a waiver of the relevant provisions of OP 14.25, paragraph 3, to allow IDA to issue the PCG proposed under the Project

[5] *Enhancing the World Bank's Operational Policy Framework on Guarantees*, Operations Policy and Country Services, November 19, 2013, paras. 4, 16, 18, 22, 60, 62; *Record of Approvals on an Absence of Objection Basis or authorizations to proceed on a Streamlined Basis between November 27, 2013 through December 5, 2013*, M2013-0068/1, para. 6.

[6] *Enhancing the World Bank's Operational Policy Framework on Guarantees*, Annex 2: OP/BP 10.00, para. 1.

C. Lessons Learned and Reflected in the Project Design

55. The Project design draws on lessons learned from infrastructure and hydropower projects both in and outside Pakistan. Most notably within Pakistan are the Tarbela Dam and the Ghazi Barotha Hydropower Project, which was also supported by the Bank. Bank-wide experience has shown that infrastructure, particularly power generation, is crucial for socio-economic development. This is particularly true in the case of Pakistan, which has a significant infrastructure gap and suffers from widespread load shedding. One of the primary lessons from such experiences is that adding substantial quantities of low cost sustainable energy generation is an important element in the long-term resolution of sector shortages, financial viability and service improvements. These long-term investments must be implemented in parallel with sector reform initiatives, to yield sustainable benefits.

56. International experience shows that most large HPPs in the world are financed in a sequenced manner (see Annex 2B for details). The sequenced financing and implementation approach proposed for this project takes into account important lessons learned from other large hydropower projects worldwide and matches the realistic implementation program on the ground. Funds committed are used when required, and the implementing agency does not have to pay for unnecessary and substantial commitment fees and interest during construction. World Bank support throughout the project, in particular in social and environment management and construction supervision and monitoring with potential additional financing and guarantees strongly mitigates the risk of commercial financing not becoming available at later stage.

57. Other lessons include: (i) project design should be based on thorough analysis, and site investigation using state-of-the-art design concepts and methods (reflecting this, the designs of the power house, intake modification, etc. are based on a series of studies and site investigations and use the best talent and methodologies available in the world); (ii) the design (and bidding documents) of key works should be completed prior to project approval; (iii) upstream detailed assessment and plans for social and environmental issues should be carried out early in project preparation; (iv) extensive *a priori* consultations are needed with various stakeholders to consider alternatives so as to minimize the adverse impacts and to make the project interventions most effective; (v) proper review of construction planning, and preparation of necessary mitigation measures, are essential to identify and minimize negative impacts during construction and in operation of the river and irrigation systems, and to avoid major interruptions; (vi) project works should be implemented through large contracts following the best contract management models whereby competent consultants with adequate resources provide high quality construction supervision; (vii) resettlement and land acquisition issues should be dealt with up front; (viii) using benchmarks for compensation is not appropriate, and the approach to resettlement and livelihood development must be articulated according to the needs of the situation; (ix) there should be adequate planning for contingencies based on risk analysis so that people are not affected by the construction works, i.e., proper plans should be in place in case of any disturbances, floods or other disasters; (x) strong government leadership and properly staffed project management offices are indispensable to effective project preparation and implementation; (xi) procurement needs to be flexible and procurement processes should start early, and retroactive financing can be very helpful to ensure an early project start-up; (xii) the speed of appraisal and implementation is critical to project success; and (xiii) international consultants and an independent panel of experts bring invaluable international expertise in overseeing the technical designs and analysis.

D. Alternatives Considered and Reasons for Rejection

58. **No Project Alternative** is not acceptable. The country has a severe power shortage and prolonged hours of load shedding. The financial impact of load shedding has been estimated at 3 to 4% of GDP and is expected to increase. This will have very negative social and economic impacts such as impeded economic growth, increased unemployment and poverty as well as social unrest. The no-project

counter factual is that people continue to meet shortages of electricity by using small generators as well as kerosene for lighting. Even if it were possible to generate the same amount of energy through these means, it would be prohibitively expensive and unhealthy due to emissions. Pakistan has a large potential of renewable and clean energy resources in the form of hydropower and in particular on the Indus River, of which only a small portion is utilized. The project would be a key element and catalyst in developing the Indus Cascade above the existing Tarbela Dam and transformational in shifting the energy mix to clean and renewable hydropower.

59. **Demand Side Management and other Renewable Sources of Energy.** In Pakistan, there exist a series of options such as Demand Side Management (DSM) and improved utilization efficiency, and reduced transmission and distribution losses that are likely to have high economic returns comparable to DHP-I (and other hydro projects). However, these are complements to, rather than mutually exclusive substitutes for, DHP-I and will be implemented regardless of whether DHP-I is built or not.

60. The main sources of alternative renewable energy available to Pakistan are small hydro, wind and solar. These options are being actively pursued and have the same beneficial impact in avoiding the environmental externalities of fossil fuel generation. However, the scale and nature of these resources are such that they cannot be viewed as a mutually exclusive substitute for DHP-I. Both of these options need to be developed to the extent they are technically and financially feasible: they are complements, not substitutes to DHP-I. In order to replace 12,225 GWh of annual energy of DHP-I, at a typical 28% annual load factor, the installed capacity of wind/solar would be 5,000 MW, requiring a capital investment of more than US$15 billion – over 3.5 times the total financial cost of DHP-I. Moreover, from the perspective of mobilizing the necessary finance for the power sector, they do not compete for the same sources of finance: wind and small hydro can be 100% financed from local commercial banks, whose resources are simply not available to large hydro projects. Phrased differently, DHP-I will not crowd out the ability to finance small renewables.

61. **Least Cost Alternative.** The proposed Project is calculated to be the least cost option for expansion of electricity generation in Pakistan. The cost of generation from DHP-I was compared with various alternatives, including thermal and potential hydropower projects on the Indus River and other rivers in Pakistan. New large hydro plants can generate power for about US¢ 4 per kWh, compared to US¢ 16.75 per kWh for fuel oil, and around US¢ 21 per kWh for diesel. The cost per kWh from various hydro plants that have been under construction or planned is provided in Annex 6, Table 6.5, which shows that the lowest estimated cost per kWh of other alternatives range from 2.49 (T4HP) to 8.55 (Hydro IPP) US cents per kWh. In comparison, DHP-I would provide electricity at 3-4 US cents per kWh (second after T4HP) making it the least cost option among the remaining identified hydro projects in Pakistan. The economic cost of installed capacity for DHP at full development is only US$976 per kW primarily because suitability of the site for a hydro project, including very narrow gorge at the site. The cost of installed capacity of DHP-I is US$1,430/kW. Given that the other hydropower plants that can generate similar amounts of energy have much longer gestation periods, the more viable immediate alternatives to DHP-I for medium-term electricity generation are likely to be heavy fuel, or combined cycle gas turbine (CCGT), possibly through the development of a liquefied natural gas (LNG) terminal, which could, in principle, be commissioned in the same time frame as DHP-I, augmented by pipeline supplies in the longer term. Thus, the cost of CCGT based generation is a good comparator for DHP-I and yields a comparison of about 10.5 US cents/kWh as compared to about 2.93 US cents/kWh from DHP-I.

Project Design Alternatives

62. **Phased/Staged Development of the Project.** The project would be developed in stages and/phases as: (i) this approach is less resource intensive, which is very important given the financial constraints the sector and the country are facing; (ii) the gestation period would be shorter, which has immensely positive impact on financial and economic aspects in addition to meeting the needs of an

energy starved economy; and (iii) the revenue from the Stage I can be used to finance Stage II of the project and other elements of the Indus Cascade, which would increase the benefits of the DHP and enhance its sustainability. These factors combined give optimal approach of developing the project in stages/phases instead of constructing it in one go.

63. **Alternative sites for the Main Structure.** The project site was identified by WAPDA in 1981 followed by the MONENCO, 1991 Study. Between Basha and Dasu, a relatively narrow stretch of about 10 km of the Indus valley was identified as one of such sites, somewhat upstream of Dasu Bridge (KKH crossing the Indus River). Dasu town, based on this study would be the downstream limit of a possible dam site since the valley of the Indus after Dasu widens, which makes a dam more expensive.

64. The feasibility study of the project (J.V. NESPAK/ACE/Harza/Colenco in association with Binnie & Partners, 2009) was carried out with the assumption that the Dasu project would be implemented after completion of the Diamer-Basha dam. In this study, several locations from 3 to 9 km upstream from Dasu bridge were investigated. For technical reasons, the initial six possible locations for the main structure were reduced to three technically feasible alternatives. Alternative 2 (Axis 5) was finally selected after extensive consultations with the affected population, taking into consideration their concerns and requests. This alternative was technically and economically more feasible and had considerably lower social impacts, with a much smaller number of people to be relocated. An adverse environmental impact is that in all three alternatives about 51 ha of the Kaigah private game reserve would be submerged by the future reservoir. The area inundated represents about 1% of the reserve. During the field studies extensive consultations were held with the local population. The selected alternative was supported by the population since a smaller population would be affected, less land (by 13 percent) would be flooded, and the village of Seo and its important physical and cultural resources including a 400 year old mosque and an ancient graveyard (5000 graves) would be spared.

65. During detailed design, two other alternative sites for the main structure (near-by within a distance of 200 m) were studied, one upstream and one downstream of the recommended site from the feasibility study. The three alternatives were compared on technical, social and environmental merits. It turned out that the upstream alternative (55 m upstream) required a somewhat lower volume of concrete and less excavation work with lower environmental impacts. This site was finally selected as the most favorable for the detailed design.

66. **Alternative Types of Structure.** Three types of main structure were considered during the feasibility study, (i) a Roller Compacted Concrete (RCC) structure, (ii) a Concrete Faced Rock fill structure and (iii) an Earth fill structure. The feasibility study recommended an RCC structure on basis of lower cost and technical advantages. The possibility of an earth fill structure was abandoned at an early stage, since the selected site is very narrow and therefore not suitable for that type of dam. The impervious material required for the construction of an earth fill dam had to be obtained from far way. A rock fill dam would be possible since abundant rocky material of good quality is available at short distance. In the technical and cost comparison between an RCC structure and a rock fill structure, the RCC structure scored much better. Construction cost of an RCC structure is almost half of that for a rock fill dam and also the construction period is shorter. Moreover, the presence of quantities of good quality of building materials was identified within the reservoir area. Large quantities of these materials for building the RCC structure can be transported to the site with an overhead transportation system. Use of such a system will also help to reduce possible negative impacts on environment and pressure on the KKH traffic.

67. **Alternatives for the Layout of Intake and Tailrace Tunnels.** Three different types of waterways (intake and tail race tunnels) were considered during the feasibility study. The most economical alternative producing significantly more energy was selected. However, this study did not evaluate the stability of the various types of rock and the possible impacts of the presence of the Khoshe

fault, a geological dislocation near to the location of the underground power house. The Khoshe fault is not an active fault, with a weak or fractured rock structure. However, its presence could possibly create water leakage from the pressurized tunnels and influence the design and construction cost of the tunnels.

68. During detailed design, four alternatives were studied. The layout for alternative 1, in which the power house is located upstream of the Khoshe fault, was worked out further during the feasibility study. The tail race tunnels are straight but are all crossing the fault, with possible negative impacts. In alternative 2, the powerhouse is located downstream of the fault. In alternative 3, any crossing with the fault is avoided, but the tail race tunnels are curved, which is a disadvantage. Alternative 4 is a slight modification of Alternative 1, in which the tail race tunnels are straight without any bend, but still avoiding the fault. This alternative is selected because of higher efficiency, since the head losses in a straight tunnel are always lower because of lower friction.

69. As shown above the choice of dam axis, waterways route and location of the power house was selected based on extensive studies and optimization considering all technical and economic factors. The current dam axis is selected considering six alternative locations along the river and combinations with the location of waterways. The waterways, number and size for power generation units and location of the power house are selected after evaluating three alternatives, considering topographical, geological and hydraulic factors to optimize the cost and benefits. The proposed scheme is the optimum layout and configuration to exploit the hydropower potential at this site and that is why the resulting plant factor and cost-benefits are very attractive.

70. **Size of the Plant and Number of Units**. To determine the optimal size of the plant, reservoir operation studies were carried out, considering developments upstream and downstream. These studies show that the 4,320 MW installed capacity when fully developed is the most optimal. Various size units and configurations were considered. Due to limitation in transportation capacity of KKH, and also the fact that bottom removal turbines units (which would better suit for a large run-of the-river plant) are not very well-tested for large units, the 360MW units are adopted for this DHP. Three such units on each tunnel, for a total of 12 units, provide optimum energy generation given the flows available in the river and their timing etc. Thus, in the final design, 12 units of 360MW each with 3 units on each tunnel were adopted.

71. **Alternative Project Financing Structures**. The alternative structuring method to the currently proposed sequenced financing would be to raise the entire financial resource required at the onset of the Project and before the start of construction. In the case of Dasu, raising the financing upfront at Financial Close (i.e. on one day) would be significantly more costly than the proposed sequenced approach. In addition, given the lack or constraints of available financing from IDA and other development finance institutions (DFIs) or uncovered commercial financing, it is not possible to get committed funding for the Total Project Costs prior to start of construction activities. Consequently there is no alternative approach to the proposed structure for a financing of the Project in sequences.

IV. Implementation

A. Institutional and Implementation Arrangements

72. The **Water and Power Development Authority (WAPDA)** was created in 1958 through an Act as an independent authority to provide for unified and coordinated development of the water and power resources of Pakistan. The Authority consists of a Chairman and three Members, one each for Water, Power and Finance, who also act as Managing Directors of their respective sections. WAPDA would be responsible for the execution and implementation of the Project through the Project Management Unit (PMU) established under the office of the General Manager (GM) DHP. The GM of DHP would also be Project Director for the Project and report to the Member (Water) and the Authority. The current PMU established under GM Hydopower Projects would be moved to GM DHP and strengthened by providing

additional staff. It would also be supported by consultants, advisors and appropriate Non-Governmental Organizations (NGOs) for implementation of the Project. For more details, see Annex 3.

73. The PMU would be supported by two sets of consultants – Construction Supervision Consultants (CSCs) and Project Management Support and Monitoring and Evaluation Consultants (PM&ECs). The CSCs would help in construction supervision, contract management, and other management aspects of the Project. For civil works contracts, the Project Director (PD) would serve as the *Employer's Representative*, and the CSCs' supervising consultant would serve as the *Engineer* for construction supervision. At the site, *Resident Engineers*, appointed by the CSCs, together with a team of specialists and inspectors, would supervise the contractor. The PM&ECs would assist in Project Management and in carrying out the role of the employer in the works contracts, and monitoring and evaluation. The PM&ECs would also supervise the implementation of the SRMP and EMP, and carry out independent M&E for Project activities and implementation.

74. The PMU would be responsible for direct implementation of all components of the Project through its engineering unit, with support from the CSC and M&ECs, except for Components D and E3. Component E3 would be implemented by the Dam Monitoring Organization of WAPDA and by Glacier Monitoring and Research Centre (GMRC) established under the General Manager Planning of WAPDA.

75. Whereas the Project would be managed under the Water wing of WAPDA, under the overall management of Member (Water), financial management of the Project would be the responsibility of the GM Finance (Power), under the overall supervision of Member (Finance) of WAPDA.

76. The **National Transmission and Dispatch Company Limited (NTDC)** was established in 1998 to take over from WAPDA its transmission and dispatch functions and all the related assets and liabilities and to be exclusively responsible for these functions in the whole country except the Karachi Electric Supply Corporation (KESC) area. NTDC would be responsible for implementation of the transmission line from Dasu to Islamabad (DTL), that is component D of the Project. The NTDC would establish a Project Management Unit (PMU), for implementation of DTL and would be supported by the design and construction supervision consultants. It would manage construction of the transmission line as well as social and environmental aspects related to this construction. NTDC has an operational Environment Social Impact Cell (ESIC). ESIC has been responsible for the planning and would continue to support implementation of environmental and social aspects. Under this credit NTDC would be responsible for only design of the transmission line and preparation of social and environmental management plans and their initial implementation.

77. **Project Steering Committee.** The Project Steering Committee (PSC) would provide planning and strategic guidance for project implementation as well as facilitate inter-agency coordination at the highest level. The PSC would be chaired by the Secretary, Ministry of Water and Power, with Secretaries of Planning, Finance, Economic Affairs Division (EAD), Chairman WAPDA, MD NTDC, MD National Highway Authority (NHA), Chief Secretary KPK, Additional Chief Secretary Development KPK, Commissioner of Hazara Division, Deputy Commissioner of Upper Kohistan and associated districts as its members. The PD of the DHP-I would be the Member-Secretary of the PSC.

78. **Independent Panel of Experts (IPOEs).** The international social and environment as well as technical panels of experts would continue to oversee the project during the construction phase and advise the WAPDA and GoP on the project issues that may arise during construction and/or project implementation period. The technical panel would be supplemented by a procurement and contract management specialist who would advise on procurement and contract management issues. The panel would continue to work during implementation of the project, first impoundment as well as during the warranty period of the major works, and meet as often as needed, but at least every six months.

B. Results Monitoring and Evaluation

79. Both PDs of WAPDA and NTDC would submit quarterly reports in an appropriate format to WAPDA, NTDC and Ministry of Water and Power, and the Bank no later than 15 days after the end of each quarter. The PMU Project Directors would be responsible for preparation of the quarterly report that would cover the progress and expected completion dates for civil works and equipment supply contracts, progress on institutional components, implementation of SRMP and EMP, training and studies, and activities of the CSCs, M&ECs etc. The reports would cover financial and procurement information, including: (i) comparison of actual physical and financial outputs with forecasts, and updated six-month project forecasts; (ii) project financial statements, including sources and application of funds, expenditures by category statement, and special accounts reconciliation statement; and (iii) a procurement management report, showing status and contract commitments.

80. Both PDs would also prepare annual reports by no later than September 30 of each year of Project implementation. The report would cover: (i) the progress of each component, implementation of key features of the SRMP and EMP, key performance indicators, operation of Project facilities, and financial statements; and (ii) the Annual Work Plan for implementation, annual funds required for implementation, an updated disbursement profile, planned actions for mitigating negative effects during construction, and target indicators for the coming fiscal year. In addition to semi-annual reviews by the Bank, detailed annual reviews would be undertaken in October each year. Two mid-term reviews of the Project would be undertaken, first by October 31, 2016 and second by October 2019. An Implementation Completion Report (ICR) would be submitted to the Bank no later than six months after the closing date.

81. The PM&ECs shall be recruited for M&E of the implementation progress, Project impact, including the implementation and monitoring of the EMP, and the SRMP. The M&E studies would evaluate the success in Project implementation in terms of meeting the Project's objectives, and assess its physical, hydrological, environmental, social, and economic impacts. The M&E activities would provide continuous feedback to the GoP, WAPDA, NTDC and the Bank on the Project's performance, and on mitigation of negative impacts under the various components, so that corrective actions, if necessary, can be undertaken in a timely manner. Changes to the Project, if any, would be reflected in the implementation review aide memoires or communicated through exchange of letters between the Bank and the Government. The Bank Team would place a staff member and/or a consultant in the country who would visit the Project site on a regular basis, particularly in first two years, to monitor the progress of construction activities, communications strategy, and EMP and SRMP activities.

C. Implementation Support, Governance and Accountability Framework

82. **Strategy and Approach for Implementation Support.** The strategy for implementation support has been developed based on the specific characteristics of the proposed Project. It aims at making implementation support to the client more flexible and efficient, and focus on the implementation of the risk mitigation measures defined in the Operational Risk Assessment Framework (ORAF). Support would be provided in all aspects covering procurement, financial management, project financing, environment and social safeguards, anti-corruption, technical aspects including instituting an independent panel of experts, coordination among contractors, institutional strengthening of WAPDA and other issues as they arise during the Project.

83. The Bank Project Team consisting of multi-disciplinary members, some would be based in the Pakistan Country Office, some members would be in Washington and others in country offices in the region to ensure timely, efficient and effective implementation support to the client. Adequate budget would be allocated to oversee implementation of the Project. Highly specialized consultants in hydropower, dams and hydraulic infrastructure have been recruited and would be maintained throughout the Project implementation period. Additional consultants with specialized skills would be recruited as

required. Timely monitoring and support to WAPDA and NTDC would be mainly provided by the team members in the country offices of the region, as well as in the Washington D.C., especially for the first 18 months. Formal supervision and field trips would be carried out semiannually, and more frequently as needed in the first year of the Project. The details are provided in Annex 5.

84. **Governance and Accountability Action Plan (GAAP).** The GoP and WAPDA and NTDC are fully committed to the Project and its proper implementation because of its importance and transformative impact on the economy and on the development of Pakistan. To mitigate and guard against poor governance, corruption and fraud risks and to improve transparency and accountability in the implementation of Project activities, a comprehensive Governance and Accountability Action Plan (GAAP) was prepared in consultation with the Borrower and would be implemented by WAPDA and NTDC.

85. The key features of the GAAP are described below and in detail in Annex 5.1 along with a full risk analysis and measures incorporated in the Project:

(i) To strengthen the capacity of the implementing agency: (a) recruitment of expert staff under the PMUs (of WAPDA and NTDC) responsible for dealing with the Project; (b) retention of independent, internationally-recruited consultants for design and construction supervision (CSC); and (c) Project management support and monitoring and evaluation consultants (PM&ECs);
(ii) To enhance internal accountability: (a) direct oversight by WAPDA, internal audit; and (b) review of contracts by the Central Contract Cell of WAPDA, which has considerable experience in procurement of such large contracts.
(iii) To ensure proactive provision of information and enhanced transparency: (a) designation of a communications officer; (b) regular reporting by PM&ECs and PMUs; (c) establishment of a website with *suo motu* disclosure of all procurement, contract and financial management information, complaints and resolution of complaints and implementation issues; (d) implementation of a communications strategy, with regular accountability meetings with civil society organizations (CSOs) and the media in the Project area and major cities.
(iv) To mitigate procurement risks: (a) smart design of a small number of contracts; (b) publication of the mapping of the procurement process; (c) ensuring multiple parties are legitimately involved at all stages of procurement, including public opening of bids in the presence of CSOs; (d) establishment of complaint filing and reporting mechanisms; and (e) placement of procurement information on the website.
(v) To review procurement and contract management: (a) the independent Panel of Experts (IPOE) would play a key role, in particular, the IPOE would review the prequalification process, and the bid evaluation report of the two major contracts under the Project for the civil works, the powerhouse, and the installation of the electro-mechanical equipment; and (b) the IPOE would also review the implementation of the contracts to ensure that the quality and the standards expected for such works are met.
(vi) To avoid potential for conflict of interest among participants in procurement: (a) certification of no-conflict-of-interest by the members of the PMUs, members of the evaluation committee, and the bidders; (b) requirements that bidders declare their agents and other possible connections to the persons involved in procurement management.

D. Sustainability

86. The hydropower plants (HPPs) provide renewable energy with minimum operation and maintenance (O&M) requirements. Therefore, HPPs are inherently more sustainable. Though DHP would have a small live storage, it is a run-of the-river (ROR) plant that does not depend on storage of water in a reservoir for electricity generation which is maximized when it is operated in ROR mode. The Indus River brings about 190 million tons of sediment annually about 20% of which is coarse sediment

i.e. larger than fine sand size. The coarse sediment would settle in the storage of DHP. The project would have 9 LLOs and two flushing tunnels to flush manage the sediment from reservoir area. In the initial years of operation the coarse sediment would be far away from the structures and would come closer in 15-20 years. Then proposed sediment management techniques usable at DHP are pressure flushing, drawdown flushing, density current venting, and dredging. System monitoring and adaptive management should guide decisions on the appropriate measures to implement.

87. Should Diamer-Basha (DB) be constructed upstream, with a larger reservoir, inflow of sediment to DHP would reduce substantially, lessening the need for any flushing at DHP for many years (over 35 years). The operation plan for Dasu is likely to be: (a) production of electricity of about 12,225 GWh annually and no flushing for 15-20 years; (b) during this time if DB is completed the Dasu would continue to be operated in the same manner; (c) if DB is delayed the flushing would be done at DHP during summer, which would mean a reduction of generation by about 3,000 GWh; (d) resume no flushing at DHP if DB is completed. The life of the project would be long over 50 years. In the later years the turbines and equipment would need more maintenance. The turbines would be coated and would have bottom removal arrangements to reduce removal time and thus facilitate maintenance.

88. The reservoir sediment rates have been generally over-estimated, particularly in case of Indus River. For example, in case of Tarbela Dam that was commission in 1976 the reservoir life was estimated at about 35 years. Although it has a large delta in the reservoir it is still estimated to have a life of over 80 years. Keeping this in mind and the fact that DHP has a very small and narrow reservoir with very low trap efficiency of sediment, and that it has properly designed sediment flushing facilities which Tarbela do not have, the operational life of DHP reservoir is likely to be much more than currently estimated.

89. From the point of view of financial sustainability, the O&M costs of DHP-I (US$37 million per year) would be very low relative to revenue generated from power generation. Therefore O&M costs are adequately covered through the tariffs and revenue collected. WAPDA generates sufficient revenue from electricity sales to maintain its hydropower infrastructure and NEPRA determines tariffs for WAPDA Hydel based on a cost plus basis. Therefore, long-term sustainability of the Project is not an issue of concern as long as WAPDA receives revenue for the sales of its hydropower. To ensure adequate resources for the sustainability of WAPDA Hydropower assets and expansion program, CPPA of the National Transmission and Dispatch Company (NTDC) Limited or such statutory agency responsible for purchase of electricity from WAPDA Hydel shall maintain a balance in an escrow account equivalent to two months of billing by WAPDA.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Risk Category	**Rating**
Stakeholder Risk	**Substantial**
Implementing Agency Risk	
- Capacity	**Substantial**
- Governance	**Substantial**
Project Risk	
- Design	**Substantial**
- Social and Environmental	**High**
- Program and Donor	**Moderate**
- Delivery Monitoring and Sustainability	**Moderate**
- Other (Optional) Financing	**High**
- Other (Optional)	
Overall Implementation Risk	**High**

B. Overall Risk Rating Explanation

90. The overall risk rating for the project is "High". This is based on governance risks primarily due to the operating environment, large contracts involved, social and environmental aspects and the risk of shortfall in proposed commercial financing of works and export credits for equipment and machinery. Each of these risks are discussed in the relevant section of the PAD. These risks will be carefully assessed throughout the project's implementation phase. A detailed Operational Risk Assessment Framework (ORAF) has been prepared (refer to Annex 4). The risks should be considered in the context of substantial benefits of providing 2,160 MW of low cost, low carbon renewable energy.

VI. Appraisal Summary

A. Economic and Financial Analysis

91. **Project Economic Analysis (See Annex 6A for details).** The Project would provide about 12,225 GWh of renewable energy annually. The economic analysis shows the Project to be cost-effective for several reasons: the site is highly suitable for construction due to the very narrow gorge and bed rock which is not very deep (thus reducing the cost of construction), and substantial annual flows and higher head available for energy generation resulting in very high plant factor about 85% for the first 1,080 MW power plant and over 65% for 2,160 MW for Stage I. Such plant factors are exceptionally high for hydropower plants, which are generally viable at around 30% plant factor. These unique features explain the high economic returns, which significantly exceed returns normally associated with greenfield hydro projects. The estimated financial capital cost is US$1,967/kW, while the economic capital cost is US$1,430/kW, far below typical green-field hydro project costs of this scale of plant that are typically around US$3,000/kW. This is consistent with the results of the recently completed capacity expansion plan prepared by National Transmission and Dispatch Company, which also shows the Project to be in the least cost plan.

92. **Methodology -** The economic analysis evaluates benefits in two ways. First, against the avoided cost of thermal generation, in which the benefits are compared against those of combined cycle gas turbine (CCGT) generation. This has been presented as the base case. Second, against the no project alternative, in which benefits are based on the avoided costs of consumers using diesel-based self-generation for power, and kerosene for lighting, in the absence of grid-supplied electricity. These are indeed the costs incurred by many consumers in the present situation of power shortages. The analysis includes a consideration of the relevant environmental and social externalities, both positive and negative.

93. **Economic Returns -** The baseline economic return against the avoided cost of thermal generation is 25 percent (NPV US$3,188 million). When the benefit of avoided GHG emissions (valued at US$30/ton CO_2) and local air emissions are included in the economic flows, the ERR increases to 27 percent (NPV US$3,824 million). The payback period is very short – the hurdle rate of 12 percent is already reached in the fifth year of operation.

94. Against the no-project alternative the ERR is significantly higher at 43 percent (NPV US$ 10,460 million) because diesel based self-generation (and lighting from kerosene) incurs significantly higher cost. The environmental cost is also higher - health damage from NOx and PM-10, avoided local environmental costs account for a larger share of the total benefits, and the value of avoided GHG emissions is also higher compared to gas-CCGT generation because the avoided emissions are based on oil. The ERR including avoided local environmental costs and avoided GHG emission benefits is 48 percent (NPV US$14,534 million).

95. The sensitivity analysis calculates the switching values for the important input variables identified in the Project Risk matrix, including the potential impact of climate change on inflow hydrology, of

security and accident risks, of construction cost overruns and schedule delays, cost of CCGT plant, as well as analytical assumptions such as consumers' willingness-to-pay (WTP) in the no project alternative. This analysis shows the returns to be remarkably robust against unfavorable outcomes: for example, the switching value for the CCGT plant is US cents 4.2/kWh and WTP is US cents 5.3/kWh. Construction costs could be 258 percent higher and the construction delays resulting in a postponement of revenue stream could continue for 8 years before the ERR falls to the hurdle rate.

96. The robustness of economic returns is also tested in a scenario analysis, in which the outcome of plausible worst (and best) case is examined. The worst case scenario combines pessimistic assumptions for all of the main risk factors. The analysis shows that economic returns are comfortably above the hurdle rate even assuming that all the risk factors produce pessimistic outcomes.

97. **WAPDA Financial Analysis (See Annex 6B for details).** As a part of the unbundling of WAPDA in November 1998, fourteen companies (4 GENCOs, NTDC and 9 DISCOs) were hived off its Power wing to function as independent commercially-oriented entities. Hydroelectric capacity remained within WAPDA under its Power wing. WAPDA owns and operates 19 hydropower stations under the generation license issued by NEPRA on November 3, 2004. Total installed capacity owned by WAPDA Hydel (as of June 30, 2013) is 6,751 MW and another 1,668 MW are under construction. Dasu Hydropower Stage I (DHP-I) would add 2,160 MW.

98. Electricity generated by WAPDA Hydel is sold to CPPA at the tariff determined by NEPRA. The electricity generated by DHP-I would go to the pool of electricity generated by WAPDA Hydel and would be sold at the tariff given to WAPDA Hydel by NEPRA for all electricity it generates and not separately for DHP-I or for any other project it undertakes. Therefore, separate financial analysis for the Project is not relevant.[7] What is relevant is the financial standing and balance sheet of WAPDA Hydel, the tariff it gets from NEPRA, past and future finances of WAPDA Hydel, and its ability to remain a financially viable entity covering all its costs and with the capacity to undertake proposed investments for expansion of hydropower generation. This assessment is described below and in more detail in Annex 6.

99. **Electricity Tariffs.** NEPRA, the state regulator, determines bulk tariffs for WAPDA on a cost plus basis covering annual revenue requirement calculated as a sum of O&M expenses, depreciation, water usage charges and hydropower profit payable to provincial governments,[8] return on regulatory asset base minus other income (mainly the dividends from the privatized Kot Addu Power Company, as 46 percent of KAPCO shares are owned by WAPDA). Tariffs are measured in two parts, 95 percent of the revenue requirement is met through fixed capacity charge (PKR/kW/m) and 5 percent is recovered through variable energy charge (PKR/kWh). The regulatory asset base (RAB) consists of average net fixed assets in operations as well as capital work-in-progress. The tariff for WAPDA Hydel given in the latest determination by NEPRA (December 18, 2013) is PKR 1.79 per kWh (or US¢ 1.79) with prior year adjustment applicable for one year after which it will be PKR 1.52 per kWh (or US¢ 1.52/kWh). The same tariff methodology would be applied to electricity generated by DHP-I, as it would be added to the pool of generation by WAPDA Hydel.

100. **The levelized financial cost of DHP-I** at constant 2014 prices is US¢ 2.93/kWh (or PKR 2.93/kWh at PKR 100/USD). In addition, it is assumed that US¢ 0.15/kWh will be paid as water usage charges and US¢ 0.005/kWh will be paid to IRSA. Thus the total financial cost of DHP-I is estimated around US¢ 3.09/kWh. As the project will become part of WAPDA Hydel's regulatory asset base, the costs and returns associated with this project will be covered through the bulk tariff that WAPDA gets on all of its generation assets. DHP-I will increase the WAPDA Hydel tariff during the construction phase

[7] Even if the financial return were estimated for the Project it would be the same that NEPRA assumes as return on the asset base (RAB) in determining the tariff, i.e., at this stage 15.22%.

[8] Net hydel profit and water usage charges are pass through costs - NEPRA has allowed WAPDA to recover these through tariffs.

(since return on investment is granted to WAPDA for the work-in-progress) and would decline after the generation starts and continues to decline as assets are depreciated and loans are repaid.

101. **Past Finances of WAPDA Hydel.** WAPDA Hydel tariff is low, compared to other sources of generation including Hydro IPPs, because most of the assets are fully depreciated and that has a direct bearing on the revenue requirement in terms of depreciation allowance as well as return on rate base. Even at these low tariffs WAPDA has been able to maintain its profitability. The review of last three years' (FY11, 12 and 13) audited financial statements of WAPDA Hydel regulated business only shows that WAPDA Hydel is in a good financial position with its accumulated retained earnings as of end June 2013 at PKR 79 billion (US$ 0.8 billion) and only 30 percent of PKR 269 billion (US$ 2.7 billion) revalued net fixed assets including work-in-progress are financed through long-term debt. The net profit is PKR 11.9 billion (US$ 119 million) to yield around 8% return on regulated asset base.

102. Like other energy sector entities, WAPDA is also affected by the liquidity crisis in the power sector. The problem of non-payment to WAPDA was also a concern when Tarbela Fourth extension project was being appraised by the Bank. Therefore, one of the legal covenants under the loan agreement with the government required the opening of an Escrow Account in which CPPA/NTDC is maintaining a minimum balance equal to two months of billing by WAPDA. The Escrow Account became operational in 2013 and has solved the flow issue as WAPDA's monthly invoices are now being paid by CPPA/NTDC on time. Later in June 2013, government also cleared WAPDA's balance sheet by paying all of its outstanding receivables (entire power sector circular debt) of PKR 480 billion (US$ 4.8 billion), including those of WAPDA or adjusting them against payables to the government. As a result, FY14 has given WAPDA a fresh start and a clean slate with normal trade debts of PKR 6.3 billion (US$ 63 million), 54 days collection period) and zero outstanding debt liability to the government. The escrow account and clearance of outstanding receivables has now paved the way for WAPDA to raise commercial financing and fast track its hydro development program.

103. **Future Finances of WAPDA Hydel.** Analysis of WAPDA Hydel's future finances requires, among other things, the projected cost of the investments it is planning to undertake in expanding hydropower generation and the tariff it would get in future. A financial model was developed for this. Using this model financial projections were made over a period of 25 years from FY14-38. For the investment program, three scenarios were developed, as described below.

- **Scenario A.** This covers existing generation capacity and ongoing investments. The existing capacity is 6,751 MW and ongoing capacity installation is 1,668 MW
- **Scenario B.** Scenario A plus DHP-I, i.e., addition of 2,160 MW capacity. Thus total capacity of 6,751 MW plus 3,828 MW including 1,688 MW of other ongoing plants; and
- **Scenario C.** Scenario B plus other priority projects adding about 21,305 MW capacity over the next 20 years or so. These include development of Indus Cascade – Diamer-Basha (4,500 MW), Dasu Stage II (2,160 MW), Tarbela 5th Extension (1,000 MW), Pattan (2,800 MW), Thakot (2,800 MW) and Bunji (7,100 MW), and projects on other river basins include Kurram Tangi (83 MW), Keyal Khwar (122 MW) and Munda (740 MW) for a total of 25,133 MW including 3,828 MW under scenarios 'A' and 'B'.

104. Based on the above investment program and tariff estimation according to the prevalent NEPRA methodology (explained above), the financial projections for WAPDA Hydel were modeled for the next 25 years. The assumptions made in this analysis are detailed in the Annex 6B. Key results for each Scenario are presented in Annex 6B Tables 6.22 6.23 and 6.24.

105. It is assumed that a major share of DHP-I will be financed through commercial financing. Terms of these commercial loans, however, are unlikely to be as favorable as concessional loans provided by

multi and bi-lateral development agencies, IDA or IBRD. Although the terms of these commercial loans are to be negotiated between WAPDA and the lenders, the analysis assumes 7 year grace period and 13 year repayment period, with IDA guarantees preferably used to extend the loan tenor. The analysis shows that under these assumptions WAPDA can pursue development of several mid- and long-term hydropower projects simultaneously and can maintain its financial viability. Reduction in grace and repayment period will tend to deteriorate WAPDA's financial viability measured in terms of Debt Service Coverage Ratio (DSCR) and current ratio. Over the next 20 years WAPDA's assets under Scenario 'C' are expected to grow by 16% per annum and almost 63% will be financed through debt, mostly commercial loans. The DSCR, however, does not fall by much compared to Scenario 'B' because as soon as WAPDA invests in other projects it would start earning return on its investment including the work-in-progress. Secondly, equity has been maximized for other projects as more funds become available increasing the self-financing ratio from 18% in the beginning to 33% towards the end of the projection period with three years moving average. Thirdly, grace period, particularly for the large projects which are likely to be financed through concessional loans, is matched with the construction period and this increases the average loan-life. Therefore DSCR estimated under Scenario 'C' is subject to the availability of financing at the desired terms. DSCR will further improve after incorporating other income from non-regulatory assets which is presently being treated as equity. Alternate options which could help improve financial viability are (i) negotiate and extend the terms of the commercial loan with lenders -- IDA Guarantees can make such extensions possible, (ii) re-work tariff formula to enhance WAPDA cash-flows to ease out its financial burden, (iii) short-term borrowing, (iv) delay planned investments etc.

106. In a portfolio approach DHP-I is least cost addition compared to other hydropower plants in the investment pipeline and its quick implementation would help in improving WAPDA's financial position by increasing its rate base while abating the tariff increase compared to long gestation projects. For example in Scenario 'D' (Scenario 'C' without Dasu HPP) resulted in higher tariff and lower generation. The analysis shows that WAPDA's investment capability would increase over time along with its asset base as DHP-I is added to the portfolio.

107. Any adverse outcome either in terms of delay in tariff determination or non-collection could jeopardize WAPDA's financial position. Realizing the importance of hydropower in the generation mix as a sustainable solution to power sector issues, WAPDA is now getting its share of revenue for the development of hydropower projects. Whereas, prior to the opening of the Escrow Account WAPDA used to have least priority in terms of payments because unlike thermal IPPs and GENCOs it did not have to pay for the variable fuel cost. Its importance has also been realized by the government in the National Power Policy 2013, which states that maximum delay limits for payables set for RFO and gas should apply to hydropower IPPs and WAPDA.

B. Technical

108. From a technical point of view, the works included in this Project are not overly complex or extraordinarily challenging. Such structures have been constructed several places in the world. The scale of construction in such a remote area would be a challenging task. Works are being designed by highly competent international consultants and would be supervised by an IPOE. The turbines, generators and other related equipment are large and would be designed and supplied by leading international manufacturers. Constructability, safety and speed of construction are major considerations in designing the structures of DHP.

109. A critical challenge is to execute the construction works according to the planned schedule. The civil works are packaged into two large contracts: (i) for river diversion, construction of main hydraulic structure, spillway, low level outlets and related works; (ii) construction of power house, and waterways to the powerhouse and ancillary facilities. All electrical and mechanical equipment would be procured through a single package. Similarly, the transmission line would be constructed under a single contract.

This would help in attracting competent international contractors with capacity to carry out such work on a timely basis. It would also help avoid any coordination issues with the equipment supply and installation contractor. The contract management would be carried out by international consultants to ensure proper coordination.

110. In designing the structure, all the underlying analyses and final designs are prepared according to international standards; these includes hydrologic analysis, hydraulic analysis, seismic analysis, sedimentation studies, material tests and strengths of material to be used for construction. Mathematical models as well as physical models were developed for the project, spillway structure and low level outlets. The designs have been reviewed by the IPOE, who have had three meetings so far. The designs have been finalized considering the advice of IPOEs. The fine-tuning of the design would continue until the bidding documents are issued; however, no major changes are expected. The IPOE would continue during the construction period, to deal with the technical, design and construction as well as social and environmental aspects. It would be augmented with a contract management specialist to provide review and advice on the procurement processing, evaluation and award of contract, as well as in contract management during the project implementation period.

C. Financial Management

111. The designed financial management arrangements for the Project are acceptable to the Bank and provide reasonable assurance on use of the Credit proceeds for the intended purposes. PMU under WAPDA GM DHP would be responsible for maintaining the financial management arrangements during project implementation. The financial management team at DHP PMU will be headed by Director (Budget & Accounts) and will include a Sr. Budget & Accounts Officer and a few support staff. Government budgeting processes will apply and the project's budget will be a part of the government's annual budget. DHP PMU will maintain books of accounts on accrual basis of accounting in accordance with WAPDA's accounting policies and manual using the accounting software implemented at the Water wing. Internal controls prescribed in WAPDA Book of Financial Powers will be applicable, including for compensation payments to Project Affected Persons (PAPs). DHP PMU will be supported by a Construction Supervision Consultant (CSC) who will verify all invoices of works before payment is made. The internal audit division of WAPDA will carry out internal audit of the Project semi-annually and reports will be shared with the Bank. Annually, WAPDA Power wing would submit its entity audited financial statements to the Bank within six months of the close of the financial year, including disclosure of operations, resources and expenditures of the Project.

112. The project will mainly use the Advance and Direct Payment methods of disbursement. Significant amount of the funds for works and consultancies would be disbursed using the Direct Payment method, whereby Dasu PMU would submit a Withdrawal Application along with supporting documents and the Bank would disburse funds to the third parties, i.e., supplier or contractor, directly. For other payments, the Project would use a report based disbursements mechanism for accessing the Bank funds through submission of quarterly projections in Interim Financial Reports (IFRs). The advances and subsequent replenishment of funds would be deposited in Designated Account maintained by the Dasu PMU, for the IDA Credit. Rolling advances of 90 days will be allowed to; (i) Deputy Commissioner Upper Kohistan District for land acquisition; and (ii) NTDC for transmission line preparatory work.

113. **Re-Lending of Credit Funds and Disbursement.** The GoP shall re-lend the proceeds of the IDA Credit to WAPDA under a subsidiary agreement to be entered into between the GoP and WAPDA, under terms and conditions approved by the World Bank. The GoP would authorize WAPDA to withdraw the proceeds of the IDA Credit and proceeds withdrawn by WAPDA would be considered withdrawn by GoP. Proceeds of the IDA Credit for design and Social and Environmental issues of the Dasu Transmission Line would be re-lend to NTDC under a subsidiary loan agreement entered between GoP and NTDC along with WAPDA, under terms and conditions approved by the World Bank, and

WAPDA would pass on the proceed for this component to NTDC according to this subsidiary loan agreement.

114. Most of the Project funds would be disbursed against large International Competitive Bidding (ICB) contracts through Direct Payments by the Bank. Such payments would be certified by the CSC (the Engineer) of the civil, mechanical and electrical works contracts. The internal control procedure and audit arrangements are described in more detail in Annex 3. The Project would also use the IFR based method to access/withdraw the Bank funds. The advance and subsequent replenishment of funds would be deposited to the US dollar Designated Account. Detailed disbursement arrangements are also described in Annex 3.

115. IDA funds for land acquisition and resettlement compensation would be disbursed after: (i) WADPA has prepared and approved the Standard Procedures for Compensation Payments in a manner and substance satisfactory to the Association; and (ii) the final rate(s)/price(s) to be paid to Displace Persons on account of Land Acquisition and Resettlement Compensations have been: (a) determined in a manner and substance satisfactory to the Association; and (b) formally endorsed by Ministries of Water and Power and Finance and publicly announced along with the process of determination. The IDA Credit funds would be used for land acquisition (with an upper limit of US$75.0 million), property and other cash compensation and resettlement and rehabilitation (with upper limit of US$36 million) in first two years of the project from credit effectiveness. Starting from year three onwards WAPDA would finance these expenditure. This would be tracked through the financial management system and monitored at least every six months using the project financial management reporting system.

116. **Retroactive Financing.** Retroactive financing of upto US$113 million for payments made against eligible expenditures incurred from November 1, 2013 to the Credit signing date shall be allowed provided that the procurement procedures are acceptable to the Bank. These funds can be used for financing the preparatory works and implementation of social and environmental costs that are procured and implemented using the World Bank Guidelines. These funds would be available for meeting the implementation cost by the WAPDA (about US$110 million) and NTDC (about US$3 million).

D. Procurement

117. WAPDA has considerable experience in procurement and execution of large civil works contracts. The procurement risk in this Project would be managed by packaging the works into large contracts tendered through International Competitive Bidding (ICB). There shall be a few large consultancy assignments, including for Construction Supervision (already awarded), Project Management Support and Monitoring and Evaluation (PM&EC), and design of future projects, etc. Major goods contracts are expected to cover field equipment, vehicles and office equipment, etc. WAPDA would be supported by a properly staffed PMU and Procurement Unit and by two consulting teams, CSCs and PM&ECs. The procurement under the project would be carried out following the World Bank Guidelines. For contracts fully financed by other financiers, procurement guidelines of the financing entity could be used. The scope and implementation of such contract would be agreed with the World Bank to ensure overall consistency with the project implementation.

118. The contract packaging is done considering ease of construction implementation, as well as possible financing arrangements for the main works i.e. component A, B and D. Also number of contracts is minimized as limited space is available in the project area for contractor camps and other facilities. As mentioned above under Section III.B during the initial bidding stage (PQ) contractors would be made aware of the availability of IDA Guarantees to cover any commercial funding that they could arrange for their contracts with commercial financiers and export credit agencies. In this case, the option for contractors to mobilize financing would be made part of the pre-qualification documents to first find out possible interest and scope. Subsequent procurement of contracts that would be bid out and expected

to be entirely financed by commercial lenders with IDA Guarantees only, would have to follow at the minimum the World Bank's guidelines for procurement under loans guaranteed by the Bank[9].

119. The project is expected to have four large ICB contracts, three of which would be managed by WAPDA: (i) the main structure and associated works; (ii) waterways, power tunnels and power house; (iii) hydro mechanical and electrical equipment; and (iv) one large contract managed by NTDC for construction of transmission line from DHP to Islamabad. The priority would be to award the first two contracts for works as soon as possible and they would be procured using slice and package method allowing bidders to bid for one or both contracts and thus bidders may provide discounts if both contracts are awarded to the same bidder.

120. For preparatory works under component C, that are financed under this credit, the contract packages that would also be procured through ICB would consist of: (a) relocation of about 16 Km of KKH and local access roads; (b) construction of office colonies; (c) construction of 132 kV line from Dubair to Dasu; and (d) relocation of remaining KKH around 40 km. The NTDC capacity in procurement needs to be strengthened which would be done by providing procurement staff under the proposed PMU that is being established in NTDC. The Bank will conduct training sessions on procurement and contract management.

121. Due to the country environment and the sheer size of the procurement involved, procurement risk is rated substantial. However, to minimize these risks, procurement documentation and record keeping systems, including a website showing the status of procurement of various contracts and their performance, would be established. A procurement complaint handling system would also be established to keep track of any complaints, etc. Details are provided in Annex 3.

E. Social (including safeguards) See Annex 7 for details.

122. As the power density of DHP is very high it has a very small land foot print compared to projects of this size worldwide. Considering this DHP is among hydropower projects with the least land acquisition and resettlement impacts. Nevertheless, with a new construction of this size there are associated social issues, and these are described below along with the measures proposed to address them.

123. **Project area and impacts.** The Project is located in the District of Upper Kohistan in Khyber Pakhtunkhwa (KPK) Province. Kohistan was under the Provincially Administrated Tribal Areas (PATA) in KPK Province. It became a District under the federal administrative system in 1976. This is a mountainous district with Dasu Town as its district headquarters. The district is sparsely populated and its people are divided along ethnic, religious and tribal lines, with a strong traditional tribal culture and established institutions. Practises of the local traditional governance system are still accepted by the provincial government and district administration in conjunction with the law of the country. The district administration involves the Maliks and conducts Jirga system for local decision-making and resolution of disputes for administration. Kohistan ranks very low in the country in terms of socioeconomic development indicators. Both literacy and school enrolment rates are among the lowest in the country. The main sources of livelihood are livestock, terraced agriculture and collection of non-timber forest products. Seasonal migration is a common pattern between areas at low and high elevation for livelihood activities. There is no land records system but tribal demarcation of territory is very distinct and people know each other's territories very well.

124. **Detailed inventory and census surveys** were carried out within the project impact areas to identify and measure project impacts and the impacted population. The data of physical impacts and the

[9] Paragraph 3.18 of the Guidelines Procurements of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

affected population have been recorded in the project database, including land, structures, trees and other assets. These surveys establish the cut-off dates for eligibility to receive resettlement benefits and any person entering the project area after the cut-off dates is not eligible to receive the agreed entitlements. These dates have been publicized and the affected communities have been notified of these dates.

125. Main adverse social impacts under Dasu Hydropower Project are related to land acquisition and involuntary resettlement. According to the surveys, a total of 4,643 ha of land will need to be acquired for various project component activities, and bulk of the land acquisition is for the reservoir area. Most of the lands to be acquired are barren lands and only about 600 ha are agricultural lands of terraced farming, grazing and orchard areas. An impact analysis conducted shows that the project would have limited impact on household income due to the anticipated land loss. 945 houses and 197 shops will need to be relocated, affecting 6,953 persons from 767 households. 31 mosques/prayer places, seven schools and 17 graveyards will need to be relocated as well. The project will have impacts related to gender, public health, downstream fishery and possible conflict between local communities and the influx of construction workers. At the same time, the project has significant potential to contribute to the socioeconomic development in the local areas. Local populations are expected to benefit from employment opportunities during the project construction phase as well as improvement of local infrastructure, public services and long-term livelihood support interventions planned under the project. Given the inactive land market in the project areas, for estimating budget for land costs, compensation rates that were negotiated and adopted for two government hydropower projects in the similar conditions in the vicinity (Diamer-Bhasha 2008 and Keyal Khawar Hydropower Project 2011 were adopted with adjustments for annual escalation for Dasu Hydropower Project.. The details about the estimates and the land acquisition process are provided in Annex 7 and Social Resettlement Management Plan (SRMP) documents.

126. **Development approach and program.** On the basis of the project impact analysis and in view of the lagging development status in the project area, the project has adopted an assistance approach with the objective not only to mitigate the adverse project impacts but also help develop and improve livelihoods of the project-affected communities and support local area development. A two-prong strategy has been adopted to achieve this target. Firstly, there will be large amount of compensation to be paid to the households and the communities. The project will assist the project-affected households and communities to use their land compensation money productively and invest them into new income generation activities. A livelihood support program is designed following this assistance strategy, with interventions and implementing arrangements. Secondly, the project will support and promote local area development through improvement in basic infrastructure, such as transport, water supply and sanitation, public services in education, health, vocational training, livestock and agricultural extension services. These will be implemented under separate programs budgeted under the project.

127. Following this strategy, WAPDA has developed a series of interventions on the basis of extensive field surveys and consultations. These interventions are packaged into a Social Resettlement Management Plan (SRMP) that includes a resettlement action plan, a gender action plan, a public health action plan, a management plan to address construction-related impacts and measures to address downstream fishery impacts. These action programs describe the strategy, approach and measures for impact mitigation and livelihood improvement for the affected population. These measures will be further designed in detail into annual implementation plans during the implementation phase. In addition, the project will set up a Development Fund of $30 million to support local area development in Upper Kohistan District, Dasu Town in particular, focusing on the expansion and improvement of education and health facilities, basic infrastructure, vocational training and livelihood extension services. The operation of the fund will be designed in detail during implementation in consultation with Upper Kohistan District Administration and local communities. These social programs are planned to start at the beginning of the project, unfold into its full implementation during the project construction period and then continue into a 10-year post-construction support phase. Following international best practices, the government has

proposed to explore and consider piloting some benefit-sharing initiatives under Dasu Hydropower Project. These will be considered and designed following further consultations with relevant stakeholders in country, including relevant federal agencies, KPK Provincial Government, Upper Kohistan District Administration and local communities.

128. The above programs are the results of a rigorous and extensive participatory planning process. This process was based on a stakeholder analysis that identified key stakeholders and assessed their respective views, expectations and roles in the planning and implementation of the project. Local consultations and *Jirga* (assembly of elders) meetings were important platforms in the planning process where local communities were closely and extensively engaged in the formulation of the project social and environmental action plans. A conflict analysis was also conducted to inform the project design.. Four national workshops were held during the planning process to share preliminary project information and seek public feedback. At the completion of the draft social environmental plans, three national workshops were held, including in Upper Kohistan District, to disseminate the planning output and seek further public input. The Public Consultation and Participation Plan (PCPP) prepared as part of the SRMP documents the consultation efforts carried out during the planning phase of the project. This participatory process will continue to be adopted for the project implementation. The PCPP also describes its strategy and implementation plan to continue this participatory approach into project construction and post-construction phase. Complementing the PCPP, WAPDA has developed a communication strategy to guide communication during its implementation, with an aim to facilitate timely information dissemination, enhance transparency, promote and increase participation of stakeholders in decision-making. Public Information Centres (PICs) are set up in WAPDA Head Office, Dasu Town and will be set up in other project areas. Participation and communication experts will be recruited to lead public consultation and communication work during implementation.

129. Kohistan has highly patriarchal society in which women are absent from public life and have very limited access to to education opportunities. A gender action plan is developed based on a gender assessment that reviewed the development status of women in the project areas, the overall operating environment related to gender and identified "entry points" for gender engagement. The approach is to focus on i) enhancing gender sensitivity among project staff and contractors, ii) raising gender awareness among local communities, particularly community and religious leaders, to develop a more understanding and supportive environment for women's participation and engagement in the project and iii) using all existing entry points to maximize women participation and benefitting from the project interventions. The plan includes dedicated awareness and capacity building interventions for women related to and the community health and education programs. Further interventions will be discussed and planned with the communities for women participation in livelihoods and employment generation activities. Within the context of such environment, the Gender and Community Health Team with local village communities will assist in designing new programs for skill development and livelihood opportunities which would involve women in the project area. The project livelihood development and capacity building programs, including agriculture, microcredit, livestock, small businesses and other "home-based" income generating activities, will include opportunities for participation of women.. DHP PMU would work with the local administration in implementation of plan for safety of women and other vulnerable local population due to influx of workers in the project area.

130. **Land Acquisition and Valuation (See Annex 7 for more details).** The Land Acquisition Act (LAA) 1894 enables the government to acquire lands for public purposes and regulates the land acquisition process. The District Deputy Commissioner (DDC) will represent the state as mandated and authorized under the LAA 1894 to carry out the land acquisition process. The DDC will follow the specified acquisition steps as laid out clearly in the LAA from initial announcement of intent to delivering compensation money. The LAA requires compensation to be paid for legally owned land at market value as averaged among recorded transactions in the past year. The DDC is authorized to convene a technical

committee to carry out this evaluation, announce and award the compensation payment. The LAA also provides for objections to be raised, heard and addressed over the compensation rates.

131. The LAA applies to Upper Kohistan District, but its application has factored in local characteristics in its standard acquisition process. The first factor is the land ownership registration and titling status under the traditional tribal land system. LAA mandates payment against registered titles. Proof of land ownership is required to be eligible for compensation and it is the responsibility of the land owner. In the absence of a land title and registration system in Upper Kohistan District, an important first step in the acquisition process is to complete land ownership registration and titling before award of compensation. The second factor is the land compensation rate evaluation process. Normally the DDC convenes a price assessment committee of heads of relevant district departments, deliberates and determines the rates using the LAA formula. The committee could also include community representatives or concerned households. The DDC announces and awards the rates if there are no objections. Sometimes, particularly with large scale acquisition, the offered rates are further discussed, negotiated and agreed with the communities through Jirga meetings. The negotiation part is important in the project areas considering the limited market transactions, absence of transaction record and the traditional governance system and practice in these areas. These practices in tribal areas have been reviewed and accepted in World Bank operations.

132. Given few or non-existent recorded land transactions in the project areas, the budget estimates for the land cost for the Project is based on the recent hydropower projects in and around Upper Kohistan District. The most recent case is Keyal Khawr Hydropower Project (KKHP) whose land compensation award was made in 2011. Its compensation rates were adopted from Diamer-Basha Hydropower Project (DBHP) whose land compensation rates were notified in 2008, revised and approved by the Economic Coordination Committee (ECC) of the Cabinet in June 2010, and agreed with local communities.

133. The process for determining the rates for DHP is just starting. It would be ensured that the, rate determination process, the outcome and the final rates would be not only approved by the District Land Committee and the implementing agency WAPDA but also by the Ministry of Water and Power (the Sector Ministry), and the Ministry of Finance (the Borrower/Guarantor). Also the process and the final price(s) will also be publicly disclosed. Completion of this process would be a condition of disbursement of IDA funds for such expenditures.

134. **Grievance Redressal Mechanism.** A grievance redress mechanism will be established under the project to hear and address any grievances from the affected families and communities. This will be a four-tier "bottom up" system of grievance redress committees (GRC), including (i) Village Level GRC, (ii) Union Council Level GRC, (iii) District-Level GRC and iv) Project Level Independent GRC. The GRC members will consist of representatives of the affected communities to be selected through Jirga meetings, project staff and local government representatives. Local communities will participate at each level to ensure their voices are heard and considered in the decision-making. The Project Level GRC will be chaired by a retired civil judge to be competitively recruited. This is to introduce elements of neutrality in the system. A separate grievance redress cell will be established under the Deputy Project Director. The composition, responsibilities and operating mechanisms the GRCs at each level are described in detailed in the Grievance Redress Plan of the SRMP. The plan also describes the GRC procedures and timeline, covering filing of cases, review and hearing, records and documentation, and notification of outcomes. The final GRC mechanisms as approved for this Project will be disclosed to the affected persons prior to Project approval. All documents related to GR cases will be maintained in the Deputy Director Office for review or verification by WAPDA. The project has budged to cover the operation cost of the GRC, including office facilities, honorarium, travel and other costs for the GRC members. The operation of this grievance redress system will be reviewed and evaluated regularly by the independent monitor. Annual evaluation of GRC activities will be conducted and its result posted on the Project website. The project will also organize orientation and training to GRC members prior to

commencement of their work. The training should be provided by competent technical experts in social/resettlement and environmental management.

135. **Implementation Arrangements for SRMP.** WAPDA has proposed an institutional setup for the implementation of the Dasu Hydropower Project. The General Manager/Project Director of DHP will be the executive head of the entire Dasu Project operations. A project advisory committee will be established at the site, with a major coordination function, to review, discuss and advise on project policy and implementation issues. The committee will consist of representatives from WAPDA, Upper Kohistan District Administration and local communities. A layered institutional setup will be put in place to implement various social programs, including WAPDA Dasu Social Team, Dasu Implementation TA team of international and national experts, Upper Kohistan District team. The required expertise and staffing plan has been proposed and included in the SRMP. NGOs, experienced in rural development and with operational experiences in Upper Kohistan District, will be engaged to facilitate and implement livelihood and public health programs. These are described in the SRMP and mobilization of experts has already started. Both internal and external monitoring mechanisms will be established under the project. A qualified institution, independent of WAPDA, will be recruited to carry out independent monitoring of the various social programs. Its qualification, scope of assignment and reporting requirements are detailed in the SRMP.

136. **Dasu Transmission Line.** A transmission line is proposed to be constructed to evacuate power from Dasu Hydropower Plant to Islamabad via Mansehra (new double circuit line of 250 km upto Mansehra and improvement of existing lines of 100 Km from Mansehra to Islamabad). A general corridor has been selected and the alignment is still being studied. A socioeconomic survey has been conducted in the alternative corridor districts to establish a socioeconomic baseline, conduct initial round of consultations with local communities and carry out screening of possible project impacts. These field surveys indicate that the transmission line will require land acquisition for the tower posts and may cause damages to crops and orchards, disruption of local access routes, and impose restrictions on the land use within the transmission line corridor. NTDC has developed, with an ADB technical assistance, a Land Acquisition Resettlement Framework (LARF) in line with relevant government and ADB policies. NTDC has adopted this LARF for all its investment operations to be funded by international financial institutions, including ADB and World Bank. The LARF has been reviewed and approved by ADB for compliance with its resettlement policy. The World Bank has reviewed the LARF, recommended further revisions and has approved it for compliance with OP4.12 under CASA1000 Project. NTDC has confirmed that Dasu transmission line will follow the same LARF for dealing with land acquisition and resettlement issues. Once the transmission line design is completed and the alignment is finalized, detailed resettlement planning will start and resettlement action plans will be prepared in line with the LARF.

F. Environment (including safeguards see Annex 8 for details)

137. In comparison to dominant thermal power generation in the current energy mix, Dasu is comparatively clean from an environmental perspective, generating expected net emission reductions of over 223 million tons of CO_{2e}. The very high power density (see Table 1) also means that the project's overall environmental footprint is inherently low compared to other hydropower projects of similar size. Key features of the project and its area of impact which are considered favorable from an environmental impacts perspective include: (a) minimal expected residence time of water in the reservoir due to the run-of-river design; (b) limited natural aquatic biodiversity in the Indus and tributaries in the project area due to its high sediment load, glacier melt and turbulent waters with very high discharge rates during summer (only five fish species reported, of which none are on the IUCN Red List); and (c) low terrestrial biodiversity in the submergence zone (67 percent barren land rocks and limited vegetation in the direct area of influence, with biodiversity rich zones located only at higher elevations, above 1,500 meters ASL). Alternatives analysis carried out during dam siting and main project design decisions during the

feasibility assessment stage furthermore aimed to minimize the project's impacts – for example, the quarry sites for aggregates required for construction are located within the future reservoir submergence area, and the dam location was adjusted to avoid submergence of a 400 year old mosque in the village of Seo (see earlier discussions under Project design alternatives).

138. Nonetheless, the DHP-I is considered a Category A project under the World Bank's Environmental Assessment Policy (OP 4.01), as it is expected to cause significant and diverse environmental and social impacts during both construction and operational phases, some of which will extend beyond the direct project area. In addition, the proposed project is part of a larger plan for future development of additional cascading hydropower and storage dams envisioned on the Indus River, and therefore cumulative impacts of these projects' impacts at a basin-wide scale are equally important.

139. Three other World Bank environmental safeguard policies are also triggered, and are treated in an integrated fashion through the project's Environmental and Social Assessment as described below. OP 4.04 (Natural Habitats) is triggered, given that the proposed project will submerge or otherwise impact approximately 1800 ha of terrestrial habitat, convert 73 km of riverine habitat into a reservoir, cause changes to both upstream and downstream aquatic habitat along the Indus by creating a barrier to movement of biota, and indirectly lead to increased pressure on highland forest habitat due to project-related influx and resettlement. OP 4.11 (Physical Cultural Resources) is triggered, given that several important cultural or archaeological resources are found in the project area, with an additional high probability of "chance finds". Lastly, OP 4.36 (Forests) is triggered given that the project will cause the direct loss of approximately 21,000 individual trees, will indirectly cause increased pressure on highland forests as mentioned above, and will develop forestry plantations and programs to mitigate these impacts.

Summary of environmental studies undertaken and planned

140. **Environmental and Social Assessment:** To analyze and ensure appropriate mitigation and management of these impacts, WAPDA has prepared an Environmental and Social Assessment (ESA) for the project covering all aspects of the project and its associated and ancillary facilities, including the realignment of about 52 km of the Karakoram Highway to be submerged, with the exception of the two parallel-running 500 kV transmission lines (at full development of DHP) of approximately 250km length (which will be studied separately). The ESA report was prepared by a team of independent environmental and social consultants. To produce the ESA, the independent consultants drew heavily from the extensive baseline data, analysis and planning efforts which were carried out by the consulting team responsible for the project's main feasibility and engineering design studies (which are available as supporting documentation in a series of eight volumes collectively called the Environmental Management Action Plan, or EMAP), and supplemented this work with additional analysis as required by Bank safeguard policies. The project's environmental impacts are organized in the ESA according to project siting and design, construction stage, and operation stage.

141. **Cumulative impact assessment**: A cumulative impact assessment has been prepared as part of the ESA, to evaluate the impacts of the DHP when taken together with impacts from other planned water resources and hydropower projects within the Indus Basin (including main stem and tributaries) which are considered likely to be developed within the next 20 years. Non-hydro or water resource related developments are not considered likely in this mountainous and rugged terrain belonging to the lower Himalayan and Karakorum mountain range. Although the first phase of WAPDA's "Vision 2025" program for Indus Cascade development envisions an eventual 4 dams along the Indus main stem upstream of Tarbela – namely, Thakhot, Pattan, Dasu and Diamer-Basha, given fiscal space constraints for the financing of such large investments, realistically only Dasu and DB are expected to take place within the next 20 years. As such, the cumulative impact assessment focused on these two projects, plus six smaller projects planned for Indus tributaries between DB and Tarbela. The evaluation is based on the assumption that DHP-I will be constructed during and begin generating electricity in five years. DB

project and other smaller hydropower projects proposed for Indus tributaries between DB and Tarbela could produce electricity by or before 2030.

142. The temporal and spatial scope of the Cumulative Impact Assessment is inevitably limited in order to ensure that the assessment remains relevant and adds value to the project-level assessment process and to the ongoing larger, longer-term basin-level water resource and hydropower planning process for the entire Indus basin, which is being carried out under another World Bank financed project "Water Sector Capacity Development Program." Through this Program, a broader Strategic Sector Environmental and Social Assessment (SSESA) is currently underway mainly to carry out a strategic-level evaluation of the cumulative impacts of planned hydropower development throughout the Indus basin and to help the Government make strategic choices of future hydropower projects, taking into account environmental and social aspects. The study is at an advanced stage of completion.

143. Key issues examined through the Cumulative Impact Assessment carried out as part of the Dasu project ESA include, among others, the cumulative impacts to river hydrology, sediment transport and water quality, natural forests and wildlife, fish and fisheries, archaeological resources, road safety, community health, and local economies. A brief summary of some of the key cumulative effects related to these issues are summarized in an integrated fashion with the overall ESA key findings in the paragraphs further below.

144. **Environmental and Social Management Plan (ESMP):** The ESA also includes an Environmental and Social Management Plan (ESMP), which specifies mitigation measures and management plans related to the identified impacts, as well as responsibilities and budget for implementation, supervision and monitoring. The ESMP also presents detailed TORs for further studies to be carried out on aquatic and terrestrial wildlife, fisheries and forests, in order to underpin the detailed design of the forestry, fisheries, and conservation and offset programs to be undertaken. Also included are a series of Environmental Codes of Practice laying out specific management measures to be adapted by the contractors in developing construction management plans, covering issues such as traffic management, waste management, spoils disposal and remediation, worker health and safety, etc. For the implementation of the ESMP, WAPDA will establish an environmental management unit within the PMU, and will also hire construction supervision consultants to supervise contractor compliance with the ESMP on a day to day basis. Contractor will also be contractually required to set up in-house arrangements for compliance with the ESMP requirements. Overall, WAPDA's Dasu Project Director will be responsible for the effective and efficient implementation of ESMP.

145. **Transmission Line.** Given that the final alignment has not yet been selected for the stretch of new lines from Dasu to Manshera, NTDC as the responsible implementing agency has prepared an Environmental Assessment and Review Framework (EARF), which includes a diagnostic-level baseline analysis of the 500-meter-wide corridor within which the final route alignment is likely to be chosen, and lays out the process and key elements for completion of the full Environmental and Social Impact Assessment (ESIA) at the detailed design stage of this component. The EARF's characterization of the current proposed route indicates that it will pass through some environmentally sensitive areas, most notably including the Palas Valley, which has been proposed for UNESCO World Natural Heritage designation, is home to several threatened and endangered species. In addition, part of the proposed corridor crosses well-known Indus Flyway, or Bird Migration Route no. 7, along the Indus River between Dasu and Pattan and is known to be a corridor for migrating waterfowl, geese and ducks, cranes and herons on their way from Siberia towards their wintering grounds in the Indus Delta and along the coastline of the Arabian Sea, and vice-versa. The full ESIA will explore potential alternative routes to bypass Palas Valley (for example, by following the Indus River all the way to Tarbela) , and if no suitable alternative is available, will specify mitigation and offset measures as required in accordance with the Bank's Natural Habitats policy. An Avian Risk Assessment will also be

carried out in parallel to the ESIA, to ensure that potential impacts and risks to migratory and local birds are appropriately taken into account in final route alignment and design decisions.

146. Preparation of the ESIA for the transmission line is being funded from this credit. The construction of the transmission line would be financed from a future credit thus proper implementation of agreed ESIA would be ensured by the Bank during implementation. In addition, under this credit agreements would be reached that the preparation of the ESIA and its implementation would be according the standards and World Bank Guidelines.

Summary of key impacts and mitigation measures

147. **Loss of river connectivity, and changes to downstream flows:** During project operation, the presence of the dam and the diversion tunnels will break the natural connectivity of the Indus River in the 4.4km stretch between the dam and the confluence of the tailrace with the river, creating a barrier to fish movement and impacting the aquatic fauna and overall ecology of the river in this reach. From June to September, when the average river flow is higher than 2600 m^3/s (the flow required to run all 12 turbines install at full development) this impact is not expected to be significant, given that excess water will be discharged through the spillways/LLOs of the dam, resulting in at least 165 m^3/s flow in the 4.4km stretch. However, from October to May, when the average flow is 550 m^3/s (with the lowest recorded flow at 291 m^3/s), all the water will be diverted to the power house and will be released to the river through the tailrace outlet. The impact in the dewatered stretch will be partially mitigated by expected backflow of water from the tailrace up to about 1.2 km downstream of the dam during regular run-of-river base load operations, due to a favorable profile of the riverbed. In addition, a small tributary - Sieglo stream - joins the Indus at about 1.2 km below the dam, contributing an average of 1.7 m3/s of flow, and up to 0.5 m3/s during low flow season. Therefore, the loss of flow during base-load operations will be most significant in the first 1.2 km of river below the dam.

148. Should construction of the DB hydropower project and completion of stage two of DHP construction proceed, peaking power generation (if pursued, though not preferred operation) would furthermore generate additional downstream impacts due to the intentional holding followed by controlled release of river flows. During the 18-20 hour periods between peaking generation cycles, both backflow into the dewatered stretch between dam and tailrace as well as discharges downstream of the tailrace would be greatly reduced, and potentially zero during dry season. Regular run-of-river (non-peaking) operation is meanwhile not expected to alter the flow regime downstream of the tailrace, with the exception of the first-filling of the reservoir, although this will be carried out during the high flow season and at a rate of about 2m a day, which will result in only minimal impact on downstream flows (e.g., retention of about 215 m^3/s of flow, with the remaining 4,000+ m^3/s continuously released).

149. **Ecological flow**: To mitigate these impacts, the project is committed to maintain a minimum ecological flow of 20 m^3/s in the "dewatered" reach – which represents about 4% of the average winter flow and 7% of the lowest recorded flow – as well as to run at least one turbine at all times (which will generate continuous discharge from the tailrace of at least 222 m^3/s) including during future peaking operations, if pursued. To determine the ecological flow to be released from the dam, the starting point was a consideration of the water uses and needs in the 4.4km stretch. The only water uses in this stretch are to maintain aquatic life, predominantly snow carp. All other uses including for domestic and agricultural purposes are not from this section of the Indus river, but rather are met by water from the Seiglo nullah. Review of the literature as well as five years of monitoring results from the Ghazi Bharotha project about 200 km downstream on the Indus river suggests that the minimum water depth and velocity required to sustain snow carp habitat during the dry season is 0.5 to 0.6 m and 1 to 2 m/s, respectively. At Ghazi Bharotha, 28 m^3/s – representing about 7 percent of lowest 10 day mean flow – is released, and has been found to be adequate to maintain aquatic habitat for snow carps and Mahaseer fish in a 54 km stretch between dam and tailrace. Considering the differences in topography and overall

length of the dewatered stretch, 20 m3/s was considered to be adequate to maintain the desired depth and velocity conditions at least equivalent to that of Ghazi Bharotha's 28 m3/s. Hydraulic modeling of the 4.4 km stretch furthermore verified that the minimum water depth and velocities required to sustain snow carp habitat during the dry season would be maintained with the proposed ecological flow. Meanwhile, downstream of the tailrace, the total of 242 m3/s which is committed to be released at all times (e.g., 222 m3/s from the tailrace by continuously running at least one turbine, plus 20 m3/s from the dam) is equal to 44 percent of the average lowest flows in winter, which should be sufficient to maintain all downstream water uses and river ecology. The International Panel of Experts for the project reviewed and approved this ecological flow determination for the proposed project. A downstream environmental effects monitoring program will nonetheless be put in place to enable assessment of changes in ecological components and adjust the ecological flow if required.

150. **Impacts to fish and fisheries**: About 570 ha of river and tributaries will be the subject of biotic and abiotic changes caused by the reservoir. Reservoir ecology will not be typical of a natural lake environment and will undergo rapid reduction in size caused by rapid sedimentation. Water velocities along the length of the reservoir will generally be lower than in pre-reservoir river conditions. Although the reservoir will resemble a lake, surface water velocities will be high compared to most lakes and storage reservoirs. The relatively high water velocities suggest that conditions may be mainly compatible for riverine fish species, particularly along the reservoir shoreline. Spawning areas in the tributaries will be submerged and it is expected that new natural spawning areas could develop at the confluence of tributaries with the main water body at its higher end. Maintenance of these spawning areas could stimulate a proper shallow aquatic habitat with sufficient places for hiding and feeding for fish, including snow carp and other species. Developing a fish hatchery for production of native snow carp (such as are already established in India and Nepal) and stocking of snow carp in the tributaries and reservoir is recommended to compensate for the loss of habitat and fish catches through DHP. Further studies are recommended during construction and operation to establish detailed baseline data on aquatic ecology and to carefully monitor the actual impacts, in order to develop additional offset measures and research on hatchery development as required.

151. **Impacts to sediment transport:** The DHP will trap an estimated 27% of annual sediment flow into the reservoir. After about 15 years of operation flushing of sediment is likely to be required which will include drawing down and then refilling the reservoir and discharging accumulated sediments. Both sediment entrapment and subsequent flushing will affect the size, flow patterns and aquatic ecology of the reservoir itself, as well as downstream water quality. Should DB be constructed, the annual sediment load entering DHPwill drop from 200 million to 46 million tons (mostly fine fraction). The combined effect of the two projects will be significantly reduced sediment flow downstream to Tarbela. This cumulative effect on the composition and quantity of the sediments (relatively more fine fraction) reaching downstream areas will be positive in terms of lengthening the life of the Tarbela reservoir by up to 30 years; however, there may also be an incremental negative impact to aquatic ecology between Dasu and Tarbela as a result of changes to water quality from the combined reduction in sediment loads. In addition, sediment flushing from the two reservoirs – once DB fills (in over 40 years) to the point where flushing becomes required – will need to be coordinated, which could also result in a net larger increase in sediments downstream of Dasu during the combined flushing as compared to during flushing of just Dasu, in the absence of DB. The full extent and significance of these effects, including effects of changes to sedimentation patterns along river banks and in spawning areas, is not fully understood based on current knowledge of the downstream river ecology. Nonetheless, given that sedimentation will happen gradually, an adaptive management approach to developing a basin-level management scheme that minimizes the environmental impacts of sediment entrapment and flushing is appropriate. The project has committed to conduct additional fisheries baseline studies in advance of construction and reservoir filling, which will also span areas downstream of DHP, as well as to monitor downstream water quality and fish populations so that trends can be identified and corrective actions taken (including re-stocking) if required during the life of the project.

152. **Impacts to terrestrial habitat and wildlife:** The project will submerge about 1800 ha of terrestrial habitat, including a small amount of the privately held and managed Kaigah Community Conservation Area (KCCA), which is considered critical habitat as per World Bank Policy on Natural Habitats OP 4.04. The KCCA, which is supported by WWF, was established through an act of the NWFP (now KP) Government in 2000 primarily to protect the endangered Markhor sheep (*Capra falconeri falconeri*) as well as other mammal and bird species, and was holding the largest population of Markhor in Indus Kohistan during the 2005 census (150 individuals). The total area to be directly intervened within the KCCA (including submerged area as well as land required for the KKH realignment) is 82 ha, out of the KCCA's 5,000 ha, or about 1.6% of the protected area. The KCCA will also experience impacts during the construction phase related to quarrying activities, as the main project quarry will be located on or adjacent to the KCCA land in the future submergence zone.

153. To offset the loss of critical habitat in accordance with Bank Policy requirements, the project has identified four potential sites -- Kandia, Laachi, Sazin Kot and Shori. During the first years of project implementation (prior to reservoir filling), the project will carry out more detailed studies on these four sites, and will develop and implement community-based conservation programs in at least two of these four sites, based on the results of the additional studies (to verify their habitat equivalency to the critical habitat being lost) and following community engagement. The project will also support the community of the KCCA to strengthen conservation management of the area. Other terrestrial habitat outside the KCCA which will be permanently lost to the reservoir consists predominantly of rocky and barren hills with only shrubs and small tress as vegetation. This type of habitat is low in biodiversity value and abundant in the project area. Nonetheless, the project will offset this loss, which includes also the direct loss of 21,000 individual trees, by preserving and restoring highland forests both upstream and downstream of the project area through forest rejuvenation and ecological conservation plans. Furthermore, to minimize impacts to wildlife, the project will enforce strict no-hunting policies among project contractors.

154. Impacts **to highland forests**: The influx of project related personnel as well as the resettlement of displaced communities to higher elevation sites will generate indirect impacts by placing additional pressure on the natural resource base of the region, including most importantly its already dwindling forests located at higher altitudes. These forests are of significant importance particularly given that Pakistan's remaining forests cover a mere 2.0 percent of its territory. Based on household surveys conducted, local people are also heavily dependent on the forests for timber and other forest products for their income. This effect will be even more significant when considering the cumulative impact of DHP and DB, which together if constructed would lead to influx of many thousands of people to the region over a period of 25 to 30 years and combined resettlement much greater than for Dasu alone. As a result of both projects, there will be more collection and commercial trade in firewood and herbs, illegal deforestation, logging, reclamation of land for agriculture and other activities. Illegal practices such as poaching, trapping and hunting will increase.

155. To mitigate these effects, the Dasu project will firstly require all contractors to use non-wood fuels in workers' camps and Dasu colony. The project has also committed to robust programs for wildlife conservation and forestry management to benefit the broader region. At higher altitudes (> 1500 m asl) on both left and right bank of the reservoir, as mentioned in the paragraph above, a number of forest plantations will be established in currently degraded or deforested areas using native species through the forest rejuvenation plan. Communities will play an important role in planting and managing these plantations. No pesticides or other chemicals will be used in forest plantations, and community forest management activities will be designed and implemented in accordance with forest management principles that comply with the Bank's Forests Policy (OP 4.36), including maintenance of critical forest areas and other critical natural habitats, conservation of forest biodiversity and ecological functions, and respect for existing land tenure and use rights, among other aspects. In addition, a comprehensive study

will be undertaken under DHP, with the objective of determining the forestry status and trends in areas between 1,000 and 2,500 m asl in the Indus District of Upper Kohistan to develop a general ecological management plan for sub-catchment areas of DHP. Both this general plan, as well as the community-led ecological management plans to be developed for at least two sub-catchment areas as part of the offset program described in the paragraph above, will include a strong focus on sustainable forest management.

156. **Impacts to physical cultural resources:** DHP will affect 31 mosques and several graveyards. These impacts were thoroughly discussed in consultations with local communities, and mitigation measures were developed in consultations with the communities including complete salvage and relocation to higher elevations at the resettlement sites, along with in-situ protection of graves to prevent dislodging. A large field of pre-historic and historic rock carvings (50,000 rock drawings and 5000 inscriptions) is found on both sides of the Indus at the upper reaches of the future reservoir, over a distance of more than 100 km. The rock art dates from Stone Age (8-9th millennium BC) to Buddhist and Islamic periods and is internationally known as the "guest book of the Silk Route". While the proposed Dasu project will not directly impact any of the known rock carvings, about 20,000 of these engravings will be lost due to submergence from the Diamer Basha reservoir if ever constructed in future. Therefore, the importance of strengthening protection of the remaining engravings which are outside both Dasu and Basha submergence zones is heightened, given their archaeological significance. The proposed Dasu project will therefore support KP Archaeological Department to (i) procure 25 acres of land in which rock carvings are located, (ii) fence the area, (iii) provide fiberglass sheds; (iv) develop tourist facilities and (v) document the importance of rock carvings and their translations. In addition, given the high probability of "chance finds" of additional cultural resources in the project area, an archaeological survey will be carried out at the location of all earth-moving construction related activities prior to their initiation, as well as throughout the future inundation area prior to reservoir filling. Contractors will also be required to stop works until relevant local authorities are notified in the event of a chance find during construction.

G. Other Safeguards Policies Triggered

157. ***OP 4.37 (Safety of Dams):*** This policy is triggered since the project involves the construction of a large dam including associated infrastructure. WAPDA has appointed an international Panel of Experts, including five renowned experts, which has reviewed and signed off on the engineering designs of the dam and its safety aspects, including stability and stress/deformation behavior analysis, seismic engineering analysis, RCC design and construction technology, dam safety against normal and catastrophic extreme loading conditions and thermal stress, geology/geotechnical (including safety of temporary and permanent excavations and rock slope stability / stabilization measures), hydrology, sediment management, hydraulic structures (including spillway, outlet works, and intake) and hydropower generation system, and safety of cofferdam foundations and sealing method. Dam safety monitoring equipment will be installed, and regular monitoring of appropriate safety parameters will be carried out throughout the life of the project. WAPDA's Dam Safety Organization will furthermore annually conduct safety surveillance and inspection, including the monitoring of dam safety instruments and the movement of sediment. The construction supervision and quality control plan has been prepared, and the consultant is on board. The instrumentation plan has been prepared as part of detailed design and technical specification of the bidding document. The preliminary O&M and Emergency Preparedness Plans have been prepared. The detailed O&M and Emergency Preparedness Plans will be prepared six months and twelve months prior to the first impoundment of the dam reservoir. An early warning system will be installed, and an emergency response plan will be implemented in case of any dam related emergency. The Panel of Experts will continue to remain involved throughout the project implementation period, first impoundment and during the warranty period of the major works. During operation of the project an internationally recognized safety inspection regime would be followed as it has been in case of Tarbela Project. This would consist of annual inspection of the project infrastructure and every three year inspection by an external and international panel of experts.

158. ***OP 7.50 (Projects on International Waterways):*** The Project is located on an international waterway (Indus River). The source of the Indus is on the plateau of Tibet, and from there the river flows through India and Pakistan and finally debouches into the Arabian Sea. Under the Indus Water Treaty of 1960 between India and Pakistan, the use of the water of the Indus River is allocated to Pakistan. In addition, given the nature of works envisaged under the proposed Project and its location on the Indus River it is the Bank's opinion that: (i) the Project would not adversely affect the quality or quantity of water flows to other riparians; and (ii) the Project would not be adversely affected by other riparians' water use. Nonetheless, in line with this policy, the World Bank has sent notification letters to China and Afghanistan, with whom Pakistan does not have any treaties regarding Indus waters, were notified on February 8, 2014. With respect to India, in line with Indus Water Treaty, the two Commissioners of the Indus Commission representing India and Pakistan have been notified about the project. China responded on February 9, 2014 stating that it had "no comments on the proposed Project." Afghanistan responded on March 3, 2014 stating that it "found the information to be insufficient […] to provide comprehensive comments on the project." It also said "Until such information is received and the Afghan government communicated its position, we would like to cordially request the World Bank to avoid financing this project." India's Indus Commissioner sent a letter to the Bank dated March 7, 2104, asking for more technical information. The World Bank has responded to both Afghanistan and India's Indus Commissioner in writing with further information, and for Afghanistan clarifying that the Project does not receive any water from Afghanistan given the point at which the Kabul River joins the Indus River, and that further downstream from the Project site, no water from the Indus River (whether upstream or downstream) flows to Afghanistan. To date, none of the riparians have communicated a specific harm to them from the proposed project. Therefore it remains our view that the project will not cause appreciable harm to the interests of the other riparians.

159. **Consultations and Disclosure**. Extensive consultations were carried out during the detailed design phase of the project, primarily through community interactions, J*irgas* and stakeholder consultation workshops. Community consultations involved multiple methods – for example, household level interviews, participatory rural appraisal (PRA), community meetings, and focus group discussions (FGD). Given the cultural context, key issues were largely addressed by community elders at J*irga* meetings. In some sense, standard participatory tools such as PRA and FGD and small group meetings are constrained by the tribal political and decision-making systems. Therefore, J*irga* meetings are the predominant modes for disclosure and decision-making in the project area. Objectives of the consultation process were:

- Analyze household and community level issues and draw early attention for mitigations and/or resolution of the same issues
- Promote participation of the local people, local level government stakeholders, elected representatives and other community representatives to create opportunity to play a role and express their views
- Acquire suggestions of the community for mitigating any anticipated adverse environmental and social impacts and expected benefits of the Project;
- Obtain the views of various categories of vulnerable groups, discuss project impacts and benefits on these groups, and ascertain their expectations regarding project benefits
- Develop strategies to minimize potential social and environmental adverse impacts in conjunction with government stakeholders
- Promote pro-people and community-based resettlement and development strategies
- Socially prepare the community with confidence and capacity to deal with displacement, environmental and resettlement management.

160. A total of 2,392 persons were involved in various consultation meetings at the project sites and consultation workshops between April 2012 and October 2012. This included 3 Jirga meetings, 34 community level meetings, 1487 one-on-one interviews, and four consultation workshops -- one each in Islamabad, Peshawar, Lahore and Karachi.

161. **Community Consultations.** Community consultations were held during the feasibility study in 2007. A summary of consultations undertaken during feasibility study is given in Annex 9 Table 9.2. During detailed design phase, consultation meetings were conducted in 34 villages in the month of June 2012. Details of the consultations are given in Annex 9 Table 9.3. In addition to the consultation meetings, one on one consultation was held with 1,487 people during environmental and social surveys. Details of these consultations are given in Annex 9 Table 9.4. About 1500 persons and agencies were covered in these consultations.

162. **Jirga Meetings** The Jirga is like a local "workshop", in which the tribal elders deliberate on important political, legal and development issues. As an important political instrument and political process, the Jirga system plays a vital role in the social, economic and political spheres. Local jirgas in a tribal setup is called by an elder of a tribe for settling local affairs within the family, clan, sub-tribe and tribe. The jirga exercises both judicial and executive roles to settle all disputes pertaining to the distribution of land, properties, blood feuds, blood money and other important inter-tribal affairs on the basis of tribal conventions, traditions and principles of justice. Often grand jirgas are convened to resolve issues of regional and national interests. Prior to starting of detailed design, a grand Jirga meeting was held on 28th July 2011, in which a list of demands were submitted to the Project Director, DHP on behalf of the affected people of the Project. Three Jirga meetings were conducted during detailed design to inform the community leaders about the project, its details and potential impacts, and seek their participation in social and environmental assessment. Details of Jirga meetings are given in Annex 9 Table 9.5. In the first Jirga meeting held in March 2012, a committee of 'List of Notables' was formed by the Jirga to assist in environmental assessment. A new committee of 'Affectees of Dasu' was formed during the Jirga meeting in September 2012.

163. A final round of public consultations was held in Dasu, Islamabad and Peshawar in February 2014, which was in full accordance with the national ESA review and approval process. Organized by WAPDA, this final round of consultations was attended by KP EPA officials, media, local representatives, and most importantly, local community members.

164. **Disclosure.** Both the Urdu and the English versions of the draft ESA summary were distributed to local authorities and relevant stakeholders in advance of the above referred consultations held in February 2014. Copies of these documents as well as the full ESA report are available at the site project office, as well as at relevant offices in Lahore. The Summary and the ESA document have been published on the website of WAPDA and Infoshop on January 23, 2014. The updated version of these reports have also been disclosed.

165. **Communication strategy.** Recognizing the significance of hydropower in the country's development and the high profile of the DHP, WAPDA has developed a strategy to guide communications and engage with various stakeholders with the objective to increase participation and enhance transparency in decision-making during the project implementation. This strategy is developed by a team of communication experts engaged by WAPDA. The team first conducted a communications need assessment through field surveys, in-depth interviews, national consultations, media analysis, and desk research. The assessment identified and mapped key project stakeholders, audiences to be reached in particular, and analysed their respective knowledge level, perceptions, attitudes and expectations from the project as well as the national, local media environment and potential channels of communication under the project. It looked at possible challenges to the successful implementation of the project, assessed the project communication needs and reviewed the existing setup and capacity of WAPDA to conduct effective communications for DHP. The assessment formulated principles and proposed interventions that formed the basis of this communication strategy.

166. The strategy has identified and focuses on the important areas of key interventions:

- *Provision of timely information* on the project to all stakeholders, its impacts, its timing, its progress, together with a mechanism to express their concerns and grievances and ensure that these are properly taken into account in the decision-making process
- *Public participation* mechanisms to provide platform to engage with institutions opinion leaders, implementation partners, and the general public.
- A *phased multi-media communications programme* to increase knowledge and understanding of hydropower sector and to increase public support for DHP and such projects in future.
- *Internal Communications* to ensure smooth flow of information, increase knowledge, build support for the implementation of the DHP and address new and existing concerns among staffs of the project, other related government departments, and various institutions involved
- *Communications capacity strengthening* of DHP team and/or partners for effective communication on hydro projects.

167. The strategy has laid out the process and mechanisms for its implementation in each of the above areas, including audiences, key themes of message, methodology, tools and channels, indicators as well as partner institutions. This strategy will be further elaborated into detailed working plans at the start of the project. This strategy will also provide the platform to implement a select group of environmental management plans like traffic management, waste management and emergency management for their effective implementation. The cost of implementing this strategy is included in the project budget. WAPDA will be responsible for the implementation of this strategy. Its existing Public Relations Division will guide, advise, coordinate and support Dasu Office on the implementation of the communication strategy. A public communications unit will be established under Dasu Project Office at site and it will be responsible for the overall implementation of the strategy at both national and local level. National and local communication experts will be recruited to staff this unit. A communication focal person will also be assigned by the Federal Ministry of Water and Power for effective coordination between various entities.

Annex 1: Results Framework and Monitoring
DASU HYDROPOWER PROJECT (DHP)

Project Development Objective (PDO): The overall project development objective is to facilitate the expansion of electricity supply of hydro-power in Pakistan. The Project would also improve access to socio-economic services for local communities in the project area and build WAPDA's capacity to prepare future hydropower projects. This would be achieved by installing a 2,160 MW hydropower plant on the main Indus River, which can be expanded to 4,320 MW in future at very low cost. The Project is a "high-risk-high reward" operation aimed at providing low cost non-carbon renewable energy.

PDO Level Results Indicators*	Core	Unit of Measure	Baseline	Cumulative Target Values**							Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR 2	YR3	YR 4	YR5	YR6	YR7				
Indicator One: Annual electricity supply renewable energy annually	☐	GWh	0	0	0	0	0	0	4,000	12,000	Annually	Project reports, monitoring reports by M&ECs	WAPDA, Monitoring & Evaluation Consultants	
Indicator Two: Number of additional people in the project area with improved socio-economic services	☐	Number	0	2,000	3,000	5,000	8,000	10,000	15,000	20,000	Annually	Same as above	Same as above	
Indicator Three Number of large hydropower project on the Indus River prepared by WAPDA	☐	Number	0	0	0	0	0	0	0	1	Annually	Project report M&E	Same as above	
		INTERMEDIATE RESULTS												
Intermediate Result Indicator One: Construction of main hydraulic structure	☐	Percent progress	0	0	10	30	50	80	95	100	Same as above	Same as above	Same as above	
Intermediate Result Indicator two: Construction of intake, waterways and power house	☐	Percent progress	0	0	10	30	50	80	95	100	Same as above	Same as above	Same as above	
Intermediate Result Indicator Three: Number of 360 MW power units installed	☐	Number	Zero	0	0	0	0	0	3	6	Same as above	Same as above	Same as above	
Intermediate Result Indicator Four: Private/Commercial Capital Mobilized (cumulative figures)		US$ million	0	700	1000	1,500	2,450	2,450	2,450	2,450	Same as above	Same as above	Same as above	
Intermediate Result Indicator Five: Construction of RAR KKH 1, KKH2, Power line, colonies	☐	Percent progress	0	10	30	50	80	100	100	100	Same as above	Same as above	Same as above	

Intermediate Result Indicator Six: Double Circuit Transmission Line constructed 250 Km and Rehab. 100 KM.	☐	KM	0	0	0	100	200	350	350	350		Same as above	Same as above	
Intermediate Result Indicator Seven: Implementation of SRMP and EMP	☐	Percent completion	Zero	10	20	50	80	100	100	100	Same as above	Same as above	Same as above	
Intermediate Result Indicator Eight: Percentage of agreed local development plan implemented		Percent completion	Zero	10	20	40	70	80	90	100	Same as above	Same as above	Same as above	
Intermediate Result Indicator eight: Hydropower project with detailed design, environmental and social safeguards studies completed	☐	Number	0	0	0	0	0	1	Regular Support and monitoring	Regular Support and monitoring	Same as above	Same as above	Same as above	

Intermediate Result Indicator Two: Capacity Building of WAPDA	☐	Percent completion of capacity building	0	10	30	50	80	100	Regular Support and monitoring	Regular Support and monitoring	Same as above	Same as above	Same as above	

Annex 2A: Detailed Project Description
DASU HYDROPOWER STAGE I PROJECT (DHP-I)

Background

1. **Pakistan's Electricity System.** The installed generation capacity of Pakistan's electricity system is about 23,538 MW of which 6,716 MW is hydropower (6,587 MW managed by WAPDA and 129 MW by the private sector), 16,035 MW thermal and 787 MW nuclear. Four thermal generation companies hived off of WAPDA manage 4,720 MW of thermal plants. The Karachi Electric Supply Corporation (KESC) has generation capacity of 2,381 MW. The other independent power producers (IPPs) have generation capacity of 8,934 MW. In 2011-12 total electricity generation was 98,664 GWh (a 2 percent decline over the previous year) of which thermal generation was 65.70 percent (oil 36.2 percent, gas 29.4 percent and coal 0.1 percent), hydropower 29.03 percent, nuclear 4.94 percent and imported electricity from Iran 0.33 percent. Electricity consumption declined by 1 percent to 73,084 GWh. The domestic sector is the major consumer of electricity (45.3 percent), followed by the industrial sector (29.2 percent); agriculture (11.3 percent), commercial (7.6 percent), and other (6.6 percent).

2. The National Transmission and Dispatch Company Limited (NTDC) was established in 1998 to take over from WAPDA its transmission and dispatch functions and all the related assets and liabilities and to be exclusively responsible for these functions in the whole country except the KESC area. The transmission system consists mainly of 500 kV and 220 kV lines and substations and also a few 132 kV links. NTDC have about twelve 500 kV substations (14,850 MVA) and twenty-seven 220 kV substations (15,744 MVA). Its 500 kV transmission line length is about to 5,108 circuit km and the 220 kV line is about to 7,337 circuit km.

3. **Institutional Structure of the Sector.** Responsibility for policy-making for the sector is with the Ministry of Water and Power (MoWP) in coordination with the Ministries of Finance, Petroleum and Natural Resources, Planning and Development, and Environment. At the operational level, the Karachi area is served by KESC, a privately owned and operated as a vertically integrated power utility, in which the Government has retained 26 percent ownership. The rest of the country is served by an unbundled power sector. About 46 percent of the generation capacity is in the private sector, mostly in the form of IPPs.[10] The remaining 54 percent comes mainly from WAPDA Hydel and the four thermal power companies hived off WAPDA through unbundling,[11] with the remainder from nuclear power plants. All these companies continue to be state owned. Transmission and dispatch are handled by NTDC. Distribution is handled by nine[12] Distribution Companies, which were all previously the distribution area boards of WAPDA (see Figure 2.1 for the sector's institutional structure).

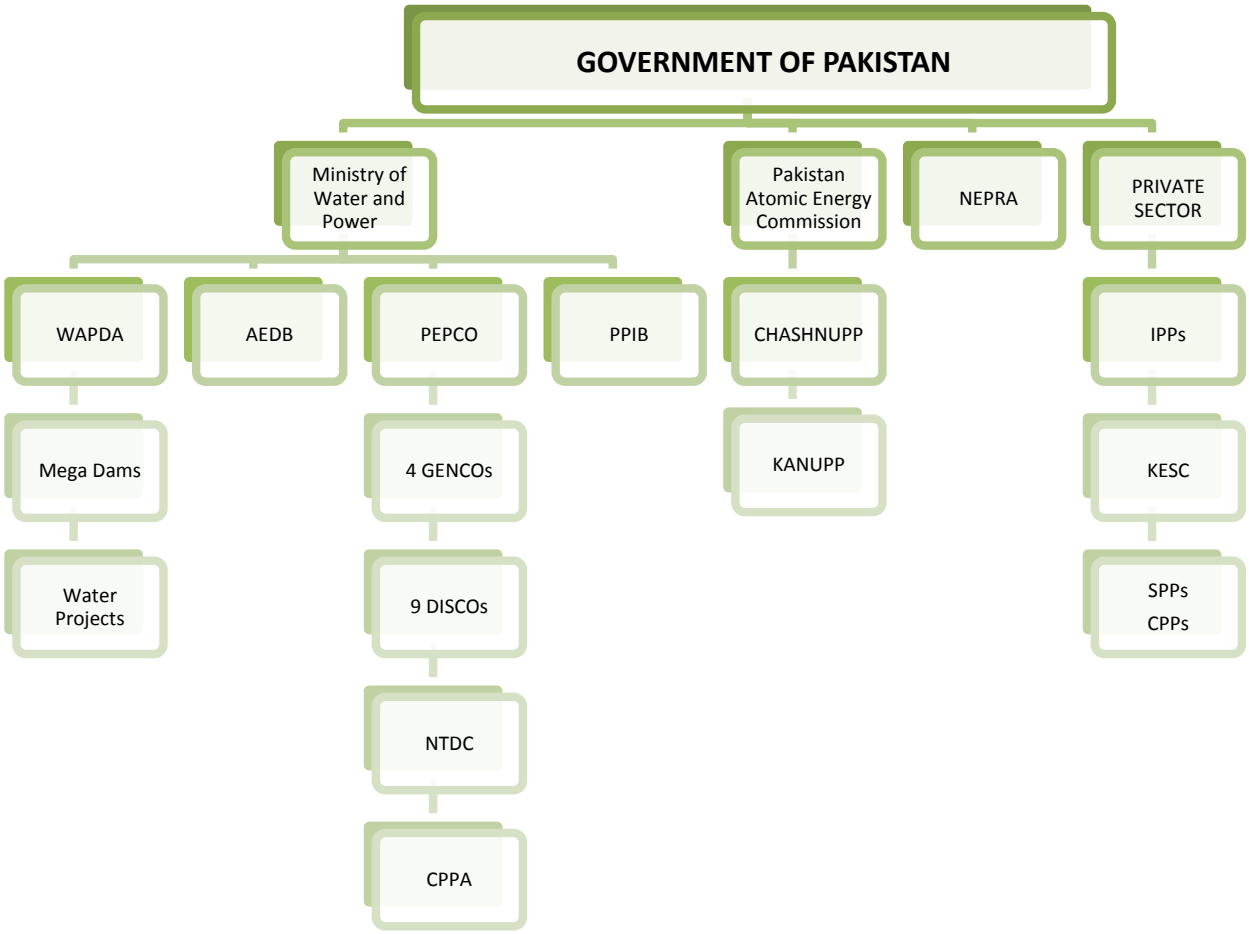
4. In addition to these, the Central Power Purchase Agency (CPPA), located within NTDC, acts as a single buyer purchasing all the power produced in the country and selling it to the Distribution Companies.

5. The regulatory body for the power sector, National Electric Power Regulatory Authority (NEPRA) was initially established in 1995 through a Presidential Ordinance and was later formally established under the provisions of Act XL of 1997 (commonly known as the NEPRA Act of 1997). To

[10] Includes KESC own generation capacity.
[11] The four thermal power companies are: Jamshoro Power Generation Company Limited at Jamshoro, Central Power Generation Company Limited at Guddu, Northern Power Generation Company Limited with its head office at Muzaffargarh, and Lakhra Power Generation Company Limited at Khanote.
[12] Five companies are in the province of Punjab: Islamabad Electric Supply Company (IESCO), Lahore Electric Supply Company (LESCO), Gujranwala Electric Power Company (GEPCO), Faisalabad Electric Supply Company (FESCO), and Multan Electric Power Company (MEPCO). The other three—Hyderabad Electric Supply Company (HESCO), Quetta Electric Supply Company (QESCO) and Peshawar Electric Supply Company (PESCO)—are in the provinces of Sindh, Baluchistan and Khyber Pakhtunkhwa, respectively.

ensure separation from the policy and operational functions of the sector, it is a part of the Cabinet Division and does not report to the MoWP. Its Board consists of four members, one each from the four provinces in the country, and a Chairman, all appointed by the Federal Government. Its main functions are to implement a licensing regime for power generation, transmission and distribution, regulate tariffs for all power sector functions, notify and enforce performance and quality standards, and promote private participation and competition in the sector. Although it determines tariffs based on tariff applications and after public hearings, its determinations are considered recommendatory as Government notification of the tariff is necessary under section 7(3)(a) of the Act.

Figure 2.1: Pakistan Power Sector Players



AEDB	Alternative Energy Development Board	CHASHNUPP	Chashma Nuclear Power Plant
DISCO	Distribution Company	GENCO	Generating Company
IPP	Independent Power Producer	KANUPP	Karachi Nuclear Power Plant
KESC	Karachi Electricity Supply Company	NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission and Dispatch Company	PEPCO	Pakistan Electric Power Company
PPIB	Private Power Infrastructure Board	WAPDA	Water and Power Development Authority

6. The MoWP has an agency named Alternative Energy Development Board (AEDB) for promoting renewable energy. There is also a National Energy Conservation Center (attached to the Ministry of Environment) for promoting energy conservation. Pakistan's nuclear power plants are handled by the Pakistan Atomic Energy Commission, which is regulated by the Pakistan Nuclear Power Regulatory Authority. There is also the Private Power and Infrastructure Board (PPIB), an agency for attracting private sector investment to power generation, and the Privatization Commission, an agency for promoting and facilitating the privatization of state owned power assets.

7. **Indus Basin Water System.** Pakistan relies on the largest contiguous water system in the world, namely the Indus Basin Water System (IBWS) for basic food security and supply of water for all sectors of the economy. The IBWS is also the source for the majority of hydroelectric power for the country. The IBWS consists of the Indus River and its tributaries, three major multi-purpose storage reservoirs, Tarbela, Mangla and Chashma, 19 barrages, 12 inter-river link canals, 43 major irrigation canal commands (covering over 14 million hectares), and over 120,000 watercourses, delivering water to farms and other productive uses. Annual river flows are about 180 billion m^3 of which about 120 billion m^3 are diverted from the river system to canals annually. The total length of the canals is about 60,000 km, with communal watercourses, farm channels and field ditches running another 1.8 million km. In addition to providing water for irrigated agriculture, the IBWS resources also support the development of major cities, industry, and growth centers as well as hydropower generation. The three dams, Tarbela, Mangla and Chashma (and Ghazi Barotha which depend on outflows from Tarbela Dam) account for over 94 percent of the hydropower capacity. The IBWS is thus the backbone of the country's economy.

8. Lack of storage capacity and control structures is a major constraint for water supply and hydropower generation. Water availability in the IBWS is highly seasonal, with 85percent of annual river flows occurring during a 90 to 120 day period (June to September), making storage imperative for the *rabi* (winter, November-March) crop season, during which the main staple crop (wheat) is grown and in early *kharif* (summer, April-October) during which cash crops (such as cotton, rice and sugarcane) are grown. Since the 1970s, Pakistan has not been able to make investments to capture and expand additional surface water supplies, while about 30 percent of the storage capacity has been lost to sedimentation.

9. **Operation of the IBWS.** Over 95 percent of the water is consumed by the agriculture sector; the Indus system and major reservoirs like Mangla, Tarbela and Chashma and the barrages are operated with irrigation as a priority and hydropower as a by-product. According to Pakistan's constitution, the river waters belong to the provinces as riparians. In the beginning, water allocation among provinces was done by discussions, often convened by the Federal Government. This was relatively easy as water resources were not as constrained as they are today. In the current environment, the allocation of water among provinces is a major cause of tension and often other political issues and mistrust become hurdles in the development of major water projects. In order to address this and to provide a proper framework and forum for allocation of water, an accord was signed by the four provinces, facilitated by the Federal Government, namely the "Apportionment of the Water of the Indus River System Between Provinces," on March 16, 1991 (commonly known as the Provincial Water Accord of 1991). The Accord has a bearing on the operation of the Indus System.

10. **Indus River System Authority.** The IRSA was established by an Act in December 1992 (Act No. XXII of 1992) to regulate and monitor the distribution of the Indus River water resources in accordance with the Water Accord among the provinces. It consists of five members, nominated by each province and the Federal Government from among high-ranking engineers in irrigation or related engineering fields. Members serve for three years and the chairman for one. The IRSA in consultation with the provinces determines the operation of the Indus River System and the reservoirs according to the guidelines of the Accord of 1991 and with irrigation as a priority.

11. **Operation of the Indus System and Dasu Hydropower Project.** IRSA places water requirements (or called water indents) on the operator of the reservoir, in this case WAPDA, for flows to be released from the Mangla, Tarbela and Chashma reservoirs for irrigation purposes. The WAPDA then carries out the instructions and can generate hydropower as a byproduct. WAPDA has some leeway in daily operation of the Tarbela reservoir as it also manages the Chashma Reservoir with a storage capacity of about 0.4-0.5 MAF that allows regulation of daily or up to a few days of flows to meet the irrigation demand downstream. Much of the irrigation system is downstream from the Chashma Reservoir. There is only one diversion point, Jinnah, which feeds the Thal Canal that is above Chashma.

12. In the case of the Indus System, conflicts between releasing water for meeting irrigation demand and for hydropower are very rare. That is because there is year round cropping and water demands are very high (Pakistan being a hot country with a large irrigation system), storage is very low compared to flows, and reservoirs are well upstream so that all irrigation water is continuously passed downstream in large quantities. Only during the canal closure period for maintenance in winter, can there be a lower supply of water for irrigation, but the closure is rotated and generally planned during the coolest period when irrigation demand is lowest, in order to avoid major damage to crops. The peak demand for electricity in Pakistan is in the summer during which time both the irrigation demands as well as river flows are at their highest; there is in fact much more water than hydropower generation capacity, so excess water is spilled through the spillways in the summer.

13. **Operation of the Dasu Hydropower Project.** The proposed DHP would be operated as the run-of-the-river (ROR) plant for maximizing power generation and thus would have no effect on the flow regime in the Indus Basin Water/Irrigation system. The operational control for IBWS would remain at Tarbela that would continue to be operated with irrigation as the priority. The small storage of 0.8 BCM can be used for daily peaking and such flows would be re-regulated at Tarbela to suit the water requirements downstream. However, such operation would reduce the overall energy generation and is not desirable. The energy generation would be maximized if the water level in the reservoir is kept at maximum conservation level providing highest possible head for energy generation, and inflow and outflow equalized, in which case the operational control for IBWS would remain at Tarbela at all times.

Hydropower is Vital for Pakistan and Development of Indus Cascade is Crucial.

14. Expansion of hydropower generation is fundamental to address Pakistan's long-term energy issues. Historically, the injection of hydropower has saved the country from energy crises. Reliance on fuel oil for electricity generation and its increasing prices in the world market are heavily taxing the sector, making electricity unaffordable for most people.

15. From the 1960s to the 1980s hydropower generation maintained a share of around 64 percent. Now it has declined to below 30 percent with the addition from the 1980s onward of thermal capacity in the public as well as private sector. Thermal capacity was added in the public sector at Jamshoro (850 MW, 1989-91), Guddu (Units 11-13, totaling 415 MW, 1992-94) and Muzaffargarh (1,350 MW, 1993-95). In the private sector, HUBCO (1,292 MW) was commissioned in 1997 (but the PPA was signed in 1992 and therefore it is not considered as part of the 1994 Power Policy). KAPCO (1,466 MW) was commissioned in 1996 under the public sector and later privatized. After the 1994 Power Policy, several more thermal power plants (IPPs) were added, tilting the mix away from hydropower and towards thermal generation. By 2010, the mix had reversed to 32 percent hydropower and 68 percent thermal. The sector remained manageable as the share of gas in thermal generation peaked at 75 percent between 2000 and 2005, before falling back to 44 percent by 2010. As a result of gas shortages in the country, during FY10, out of more than 6,000 MW of dual fuel capacity only 38 percent was generated using natural gas. The dependence on imported oil has not only caused the generation cost to increase by more than 2.5 times over the last five years but has also exposed the country to balance of payment issues. A US$10/bbl

increase in crude oil price is estimated to raise the import bill by US$1.5billion and electricity tariff by PKR 0.40 – 0.50/kWh.

16. **The Government of Pakistan's (GOP) energy strategy (2013)** emphasized the development of the Indus Cascade to add hydropower to the system to bring down the cost of generation which is crucial for the sustainability of the sector. In that context, the GOP is now ramping up its investments in hydropower development. Over the next 15-20 years Pakistan would develop the Indus Cascade between Tarbela and Diamer-Bhasha (DB) thus adding about 12,000 MW or about 71,000 GWhs of electricity generation annually. Dasu Hydropower Project (DHP) is relatively cheaper and faster to undertake with low gestation period. DHP is located on the Indus River about 240 km upstream from Tarbela dam. It is about 350 km from Islamabad. Development of the Indus cascade is the most pragmatic approach to add clean, renewable hydropower generation to the system.

17. The proposed DHP is an important element of the Government and Bank's strategy in the energy sector of supporting strategic investment projects in generation and transmission infrastructure that contribute to the structural shift to a low cost –low carbon fuel mix, while continuing to support the policy reform agenda in parallel. The Project makes a strong contribution to the energy sector agenda by: (i) contributing to long-term change in the structure of the sector away from high cost heavy fuel oil to low cost cleaner hydropower; (ii) reducing the cost of electricity generation for the whole country, reducing the sector deficit and saving foreign exchange for the Government of Pakistan by displacing imported fuel; and (iii) building the broader institutional capacity of WAPDA to harness the hydropower potential of the country in a sustainable manner. The major challenge is how to finance and develop these hydropower plants in an extremely financially constrained climate.

18. It is important not to wait for the reform program, which will take time, to be completed before support in power sector investments commences as this could exacerbate the already dire power supply situation. The two have to run in parallel. To address the financing gap in the sector, which is fundamental for its performance, a shift back towards hydropower generation is urgent and crucial to bring down costs in the long run. This worked successfully with the Ghazi Barotha Hydropower Project; when it was added in FY04, the average cost of generation declined by 8 percent while the cost of high sulfur fuel oil and natural gas rose by 4.6 percent and 2.5 percent, respectively. DHP-I is a step in the right direction as it is expected to achieve similar results – it would add about 14 percent to generation and would reduce the average generation cost by 8 percent. Compared to the same amount of energy added to the system using gas or fuel oil, the reduction in cost would be 7-18 percent. Since it has relatively less environmental and social issues related to green-field hydropower projects of similar size it is thus a "high-reward" operation.

Strategy for Development of Dasu Hydropower Project (DHP)

19. In this context, the Water and Power Development Authority (WAPDA) is starting the development of the proposed Dasu Hydropower Project (DHP) on the Indus River in a phased manner starting from 1,080 MW installed capacity initially (expected to come online in 5 years) to over 4,320 MW at completion.

20. The DHP is proposed to be developed in two stages and four phases. Each phase will add 1,080 MW of installed capacity. Stage I comprising Phase I and II would be developed first with installed capacity of about 2,160 MW while other schemes on the same river are being constructed. The Stage II would be undertaken when other schemes on Indus are completed. Phase-I under Stage I would consist of development of major infrastructure including full development of the dam, installation of the first three units of 360 MW each, tunnels and excavation for the next three units. Phase I could give enough revenue to develop subsequent phases and to support accelerated construction of other schemes. Another 1,080 MW would be installed under Phase-II of Stage I simultaneously. The Project would be designed

and constructed in a manner so that Stage II is constructed while the plant is in operation and without shutting it down for any construction activity.

21. **Hydropower Generation, Costs and Financing.** Table 2.1 below provides hydropower generation and cost under each Stage/Phase. The first phase is critical and is of higher cost (US$3,650 million) as much of the infrastructure (e.g. site preparation) and social and environmental safeguards have to be developed under this phase. However, the generation is also highest from the first phase which will offset the high upfront cost. The generation from Phase I is about 8,000 GWh as flows are available in the river to pass through the hydropower plant. A very high load factor (85%) for a hydro project is the main reason for good economic returns of more than 21% for Phase-I (excluding environmental benefits and assuming next best generation by CCGT), despite the front-loading of dam and other social and environmental management costs. With Phase-II i.e. DHP-I the generation would be over 12,000 GWh with Plant factor of 65% and ERR of 25%. The overall DHP ERR would be 28% excluding environmental benefits.

Table 2.1: Cost in US$ Million and Hydropower Generation in GWhs

	Stage I		Stage II		
	Phase-I	**Phase-II**	**Phase-III**	**Phase-IV**	**Total**
Dasu Hydropower	2,796	599	638	656	4,689
Transmission Line	350	0	438	0	788
Social & Environmental Management	504	0	0	0	504
Total, US$ Million	**3,650**	**599**	**1,076**	**656**	**5,981**
Cumulative Installed Capacity, MW	1,080	2,160	3,240	4,320	4,320
Generation, GWh	8,058	12,225	18,730	21,485	21,485
Cumulative Economic Retrun at US¢ 10.5/kWh as cost of alternative generation excluding environmental benefits					
ERR (avoided cost method)	20.8%	25.0%	27.1%	27.5%	27.5%
Levelized Financial Cost (Nominal), US¢/kWh	5.09	4.01	3.45	3.38	3.38
Levelized Financial Cost (Real), US¢/kWh	3.75	2.93	2.49	2.43	2.43

22. For transmission of power a 500 kV double circuit line would have to be erected from Dasu to Islamabad (via Mansehra) that can serve two phases/stage I that for an installed capacity of 2,160 MW. Another transmission line would be needed for Stage II. The DHP would be implemented by WAPDA Hydel and the Transmission lines would be constructed by the National Transmission and Despatch Company (NTDC).

23. In addition to starting the key element of the Indus Cascade above Tarbela the Dasu Project is extremely attractive with low financial cost and high economic rate of return as shown in the Table 2.1. The nominal levelized financial cost for the DHP-I is about US¢ 4.01/kWh or US¢ 2.93 at current costs. The nominal levelized financial cost at full development US¢ 3.4 and US¢2.4 at current costs.

Project Components

24. The project consists of the following components. The cost by component and overall cost for Phase-I & II is given in Table 2.2, 2.3 and 2.4.

25. **Component A: Construction of the Main Hydraulic Structure on the Indus River.** This component would primarily consist of the civil works required for main dam structure on the Indus River to raise the water level and thus create energy for running the power generating turbines and generators. The spillway structure would be designed to pass a discharge of about 45,000 cubic meters per second (cms) and probable maximum flood of about 52,000 cms safely and with Low Level Outlets (LLO) and two flushing tunnels on the right Bank to flush the sediment coming from upstream and deposited in the reservoir. The main dam structure would be constructed with Roller Compacted Concrete (RCC). Maximum height of the structure would be about 242 meters above the foundation (crest level at 957

meters above sea level) and length at the crest would be about 570 meters. This would allow maximum reservoir level of 950 meter above sea level (ASL) with operational storage capacity of 0.82 BCM between elevation of 900 and 950 ASL and dead storage of 0.57 BCM.

26. The spillway would be frontal overflow gated type with 8 radial gates (each gate 16.5 meters wide and 22.4 meters high). The spillway crest would be at 930 m.a.s.l. The Dam would have 9 Low Level Outlets (LLO) and Two Sluicing Tunnels placed at 833 m.a.s.l. The size of these LLOs would be about 6.4 meters circular with capacity to pass 2,280 m^3/s discharge in free flow condition (and 12,157 m3/s at full level) and the two flushing tunnels would discharge 2,120 m^3/s in free flow condition as well (the flushing tunnel is operable only under free flow condition). All civil works, gates and other water controlling facilities would be included in this component and constructed under DHP-I.

27. **Component B: Power Generation Facilities.** The power generation facilities would be developed in two stages and four phases. Four Headrace Tunnels (HTs) would divert water from the reservoir for power generation to the Power House (PH) constructed underground. Water passing through the turbines would be discharged from the power house to the river through four Tailrace Tunnels (TTs). Each Headrace Tunnel would supply water to three generation units of 360 MW each. There would be a total of 12 units with a total installed capacity of 4,320 MW at full development. Similarly each TT would discharge water from three generating units. Underground sub-stations would be constructed to serve the power house.

28. **Component B1: Construction of Power Generation Facilities.** In Stage I-Phase I, the following facilities would be constructed:

(i) Excavation of power house cavern with capacity to accommodate 10 turbine units;
(ii) Complete Power house for Phase I & II i.e. 6 units including loading bay and control bay;
(iii) Complete Headrace Tunnel 1 & 2 (HT1 & HT2) along with the power intake, gate shafts, pressure tunnel and trifurcation for installation of Penstocks;
(iv) Tailrace Tunnel 1& 2 (TT1 & TT2) that would discharge water from six units installed on HT1 & HT2 along with a surge chamber, all mechanical equipment to connect to draft tube and tailrace control structure;
(v) All intakes, in addition to HT1, HT2, HT3-4, with control gates and and sufficient length (30 to 50 meters behind each gate shaft) so that construction of the corresponding tunnels can be started in future; and
(vi) Underground sub-station that could serve Stage I.

29. **Component B2: Turbines, Generators and Electro-mechanical Equipment.** Six units of 360 MW each with total installed capacity of 2,160 MW would be installed under Stage I. These units would be supplied water by HT1 & HT2 and discharge into TT1 & TT2 and would be connected to the sub-station. The turbine runners would be bottom dismantling type and coated to protect them from abrasion against sediment.

30. The electrical and mechanical equipment installed would be adequate to serve the six generating units to be installed in Stage I. Other essential equipment that would complicate installation if installed in Stage II would also be installed under Stage-I. A similar approach would be used for the underground substation. However, electrical equipment installed at the sub-station would be that needed for the six units of Stage-I.

31. **Component C: Preparatory Works.** These include access roads, KKH, construction of 132 kV transmission line from Dubair to Dasu, offices, residences and colonies for staff.

32. **Component D: Transmission Line.** For transmission of power a double circuit 500 kv line would have to be installed from Dasu to Islamabad (via Mansehra) that can serve two phases with an installed capacity of 2,160 MW. Transmission line would be constructed by the National Transmission and Dispatch Company (NTDC). The component would have three sub-components: (D1) construction of Dasu Transmission Line (DTL); (D2) preparation of designs, and social and environmental management plans construction supervision and project management; and (D3) social and environmental management costs. These all activities would be executed by NTDC.

33. **Component E1: Social and Resettlement Management Plan for DHP.** The Social and Resettlement Management Plan (SRMP) will include programs designed to address social dimensions of the proposed project, including construction of the dam and reservoir area , as well as the transmission line. For the dam and reservoir area, the SRMP will cover compensation, resettlement and livelihood development of the affected population, public health interventions, measures on gender and vulnerable communities, mitigation measures to address fishery impacts downstream, and mechanisms on benefit-sharing to support local development. For the transmission line, NTDC has already adopted a Land Acquisition Resettlement Framework (LARF) for its investment operations. The World Bank has reviewed and accepted LARF for compliance with OP 4.12. Dasu Transmission Line will follow the LARF for dealing with its land acquisition and resettlement aspects. Detailed resettlement planning will be carried out during the course of the project implementation when the alignment of transmission line is finalized and resettlement action plans (RAP) will be developed.

34. **Sub- component E2: Environment Management Plan.** All construction related environmental issues would be addressed in the construction contracts, the cost of such measures is included in the construction components. This component would include those activities which are not or cannot be covered under the construction contracts. The main elements are -- environmental mitigation and monitoring, tree plantation, slope stabilization and watershed management along the reservoir area and relocated KKH, enhancement of the aquatic life in the river upstream and downstream upto Tarbela, physical cultural property issues and other unforeseen issues that need to be addressed during the project.

35. **Sub-component E3: Flood warning system, watershed, sediment and river monitoring.** Most of the water resources of the Indus River are derived from glacial melt, and the DHP is designed to withstand probable maximum floods that may be caused by glacial lake outbursts. Continued monitoring of glaciers is crucial for the water security of the country, and useful for developing the knowledge base for the operation of the dam and for planning future hydropower investments in the Indus Basin. Watershed monitoring, sediment and river monitoring that would help in the operation of the DHP would be supported. This is intended to examine the characteristics and movements of these glaciers, and provide early warning for glacial lake outbursts.

36. Climate change studies have indicated that the future temperature rise in the region will affect the glacier melting process and availability of water for hydropower generation, and may cause extreme events such as floods. The 20101 floods were worst in the country's history with large amount of damages in human lives, livestock and agriculture. DHP is designed for a probable maximum flood to withstand combined flood events resulting from glacier lake outbursts (GLOFs), intense rainfalls and natural flows. For better management of flood waves and safe operation of DHP and other hydropower projects in the country, it is imperative to have an early warning system for these hydropower catchments. There is no flood telemetry network in the DHP catchment. Hence the existing telemetry network in River Indus will be extended to the upper catchments of River Indus. This will include installation of river level, temperature and rain sensors at flood warning sites and connecting them with reliable telecommunication system. The component would support works, equipment, operations cost and training for the establishment of the flood telemetry network. The component will be implemented by the Hydrology & Research Directorate of WAPDA.

37. This component would support the monitoring and improvement of the watershed and catchment in Pakistan of the DHP and the river upstream and downstream upto Tarbela.

38. **Component F: Construction Supervision, Monitoring and Evaluation of the Project Impacts and Social and Environmental Management Plans.**

39. **Sub-component F1: Construction Supervision and Implementation Support.** This sub-component would cover the cost of consulting and other services for Project implementation, including construction supervision and Project management support. It would also cover implementation of all activities under the Project, including: procurement, contract administration, quality control, certification of payments, financial management, preparation of any additional designs, and bidding documents, etc. as well as support in implementation of SRMP and RAP etc.

40. **Sub-Component F2: Project Management, Monitoring and Evaluation of the Project Impacts and of Social and Environmental Management Plans.** The Management Support and monitoring and evaluation (PM&E) activities would provide continuous feedback to the Government of Pakistan (GoP), Ministry of Water and Power (MoWP) and WAPDA on the Project's performance and impact of its various components, so that corrective actions could be undertaken in a timely manner. The monitoring would be carried out by independent Project Management and M&E consultants (PM&ECs). They would also supervise implementation of the SRMP and EMP and provide independent monitoring of the various activities, assess positive and negative impacts and propose alternatives to address any long-term or, during construction, social and environmental issues. The PM&ECs would also provide management support to help enhance the capacity of the WAPDA/PMU in Project implementation and contract management, helping it play an effective employer role under major works contracts.

41. **Component G: Project Management Support, Capacity Building of WAPDA, Technical Assistance and Training and Future Project Preparation and Strategic Studies.**

42. **Sub-Component G1: Project Management Support and Audits.** This sub-component would support WAPDA in implementing Project related activities, including support for operation of the PMU, capacity building, incremental staff salaries, operations cost and audits, etc.

43. **Sub-Component G2. Strengthening of WAPDA, Independent Panel of Experts and Technical Assistance.** This sub-component would build the capacity of WAPDA to effectively implement the Project, O&M of the dams it manages, and fully carry out its mandated functions. These activities would include, but not be limited to: (a) enhancing WAPDA's capacity in planning and programming, engineering and O&M of the dams, financial management, procurement, and management of environmental and social aspects; (b) technical assistance and training in such areas as design of dams, river training works, hydraulics, detailed designs of structures, contract administration and construction supervision, procurement, operations and management planning, asset management plans, financial management, and legal issues (such support would include on-the-job training, post-graduate programs, seminars, workshops, and study tours, etc.); (c) implementation of the governance and accountability action plan (GAAP); and (d) an independent panel of experts (IPOE) for design and construction quality, safety enhancement or any other issues that may have to be addressed during Project implementation.

44. It would also support the strengthening of WAPDA's capacity in devising strategies to become a financially autonomous entity with a strong balance sheet and an ability to develop and finance hydropower infrastructure with strong technical expertise and good governance culture. This support would include, but not be limited to: (a) development of financing strategies for water sector programs and hydropower infrastructure, (b) provision of advice on a variety of financial, fiscal, legal and regulatory aspects; and (c) review of the medium-term investment program, development of the long-

term investment program and preparation of a financing strategy, including areas of potential interest to the private sector.

45. **Sub-Component G3. Future Project Preparation and Strategic Studies.** This component would support strategic studies to address technical, financial or management issues, mitigation measures, pilot projects and preparation of future projects that may be identified during Project implementation and agreed upon with the Bank.

Project cost.

46. Total cost of Stage I is around US$4,250 million. See Table 2.2, 2.3 and 2.4 for cost summary by component for Phase-I and Phase II and Stage-I respectively. The cost of Phase-I is about US$3,650 million. This cost includes all cost of preparatory works, and social and environmental costs required for the project for full development of the project as well as full development of the Main Hydraulic structure and ancillary works (i.e. 4,320 MW plant), cost of preparatory work to allow start of construction for Stage-II of the project and the transmission line for Stage I. Phase-I cost also includes one waterway to the powerhouse and electro mechanical equipment for 3 turbines of 360 MW each with total installed capacity of 1,080 MW. The cost of Phase-II (Table 2.4) cover one additional waterway for the additional three power units of 360 MW each, electrical and mechanical equipment for three units and supervision and project management cost. The cost of the Phase- II is only US$589.2 million. The cost estimates are based on October 2013 prices with 10% physical contingencies for works and 5% for steel works machinery etc., added to all works and equipment. Physical contingencies of the social cost are taken as 25%. Price contingencies are estimated assuming 2% escalation annually in USD terms and 5% taxes are added for imported steel and machinery.

Table 2.2 DHP-I Phase-I Project Cost Summary by Component (US$ Million)

	Total Including Contingencies	IDA Credit 1
A. Main Structure	**1,479.7**	**10.0**
B. Power Generation Facilities	0.0	
B1 Powers House Civil Works, Intake, Pressure Tunnel underground substation etc	503.1	
B2. Turbine, Generation and Related Equipment	340.1	
Sub-total B	**843.1**	
C. Preparatory and Other Works	**344.8**	**183.9**
D. Transmission Line (NTDC)		
D1. Construction cost	300.0	
D2. Project Management and Supervision	10.0	10.0
D3. Social and Environmental Costs	40.0	5.0
Sub-total D	**350.0**	**15.0**
E. Implementaton of SAP and EMP, Dam Monitoring		
E1. Social Action/Management Plan (SAP)	438.9	201.5
E2. Environmental Management Plan (EMP)	54.5	54.5
E3 Watershed, sediment and River Monitoring Program	10.5	10.5
Sub-Total E	**503.9**	**266.5**
F. Consultancies for Supervision		
F1 Construction Supervision consulting services	60.0	45.0
F2 Project Mannagament M&E, supervision of EMP and SA	8.0	8.0
Sub-total F	**68.0**	**53.0**
G. Project Management, TA, Training		
G1 PMU support and audits, etc.	30.0	30.0
G2 Capacity building TA, POE, training	10.0	10.0
G3 Strategic studies and future project preparation	20.0	20.0
Sub-total G	**60.0**	**60.0**
Total	**3,649.6**	**588.4**

Table 2.3 DHP-I Phase-II Cost Summary by Components (US$ Millions)

Project Component	Base Cost and Contingencies	Total Including Contingencies
B1 Powers House Civil Works, Intake, Pressure Tunnel underground substation etc.	203.0	252.3
B2. Turbine, Generation and Related Equipment	244.0	302.3
Sub-Total	447.0	554.6
F. Construction Supervision, monitoring,services	25.0	31.1
G. Project Managmet, TA Training etc,	10.0	12.4
Base Cost	482.0	598.2
Physical Contingencies	36.0	0.0
Price Contingencies	80.2	0.0
Total	**598.2**	**598.2**
Taxes and Duties 19%	113.65	

Table 2.4 DHP-I Stage I Cost Summary by Component (US$ Millions)

Project Component	Base Cost and Contingencies	Total Including Contingencies
A. Main Structure	**1,245.9**	**1,479.7**
B. Power Generation Facilities		
B1 Powers House Civil Works, Intake, Pressure Tunnel underground substation etc	626.5	755.4
B2. Turbine, Generation and Related Equipment	530.6	642.4
Sub-total B	**1,157.1**	**1,397.8**
C. Preparatory and Other Works	**294.9**	**344.8**
D. Transmission Line (NTDC)		
D1. Construction cost	252.6	300.0
D2. Project Management and Supervision	8.4	10.0
D3. Social and Environmental Costs	40.0	40.0
Sub-total D	**301.0**	**350.0**
E. Implementaton of SAP and EMP, Dam Monitoring		
E1. Social Action/Management Plan (SAP)	325.1	438.9
E2. Environmental Management Plan (EMP)	45.9	54.5
E3 Glacial, Watershed, sediment and River Monitoring Program	10.5	10.5
Sub-Total E	**381.5**	**503.9**
F. Consultancies for Supervision		
F1 Construction Supervision consulting services	85.0	91.1
F2 Project Mannagament M&E, supervision of EMP and SAP	8.0	8.0
Sub-total F	**93.0**	**99.1**
G. Project Management, TA, Training		
G1 PMU support and audits, etc.	40.0	42.4
G2 Capacity building TA, POE, training	10.0	10.0
G3 Strategic studies and future project preparation	20.0	20.0
Sub-total G	**70.0**	**72.4**
Base Cost	3,543.3	4,247.7
Physical Contingencies	**343.9**	**0.0**
Price Contingencies	**360.4**	**0.0**
Total Project Cost	**4,247.7**	**4,247.7**
Tax contents 19%	807.1	

Annex 2B: Financing Strategy and Financing Plan
DASU HYDROPOWER STAGE I PROJECT (DHP-I)

A. Financing Strategy

A.1 Sequenced Financing Package Approach

1. Financing this Project in sequences is the only viable option to raise the required funding of this Project. It is therefore proposed that the sequenced technical implementation of the Project will be adopted for the financing approach, which means that the required financing will only be mobilized when needed. It is also by far the cheapest option for Dasu as the following analysis will show:

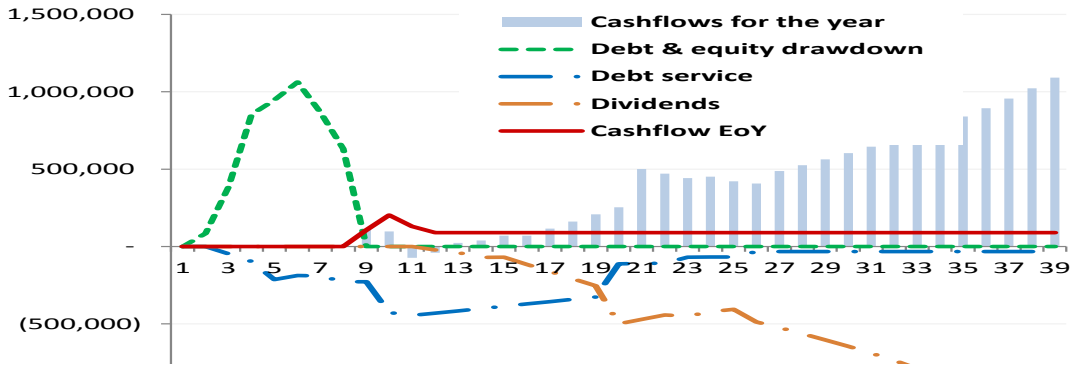
2. In the case of Dasu, the financing required if fully raised at Financial Close (i.e. on one day) is US$5.3 billion. If the financing is raised in sequences, the total financing required will be US$4.8 billion. Given the lack of available financing from development finance institutions (DFIs) or uncovered commercial financing, it is impossible to get committed funding for US$5.3 billion prior to start of construction activities for the project. In addition, such an approach would increase the financing requirements by about US$471 million thereby increasing the burden on the borrower. The Table 1 summarizes the breakdown.

Table 1: Cost of Dasu HPP With or Without Sequenced Financing (US$ million)

Cost	Financing upfront	Sequenced financing
Capex	4,247.7	4,247.7
Financing cost	1,029.8	558.6
Capex + financing cost	5,277.5	4,806.3

3. Figure 2.1 shows key financial indicators for the sequenced financing scenarios. It shows the cashflow at the end of the year – always positive – (solid line), the debt drawdown (dotted line), the debt service and dividends (discontinued lines). This demonstrates that a sequenced financing approach would have a positive cashflow throughout the project lifetime, whereas a much higher debt service requirement in a non-sequenced approach will be less robust and may lead to negative cash flows in initial years

Figure 2.1: Key Financial Indicators – Sequenced Financing Scenario



4. The sequenced financing option is therefore by far the least cost option for Dasu. Raising the financing in a sequenced manner would save about US$471 million, or about 11.1% of capex cost. By raising financing as needed, the borrower would not have to raise more than US$2 billion at a time

thereby increasing the likelihood of raising financing. If financial closing were to occur on day one, the Project would have to raise the full US$4.2 billion plus IDC, which is not feasible given the lack of availability of capital by WAPDA and/or Government of Pakistan. As described in the following section, the amount of funding currently available is not sufficient to finance the whole project upfront, so the choice is between not doing the project or doing it sequentially. It is therefore proposed that the sequenced technical implementation of the Project be adopted for the financing, which means that the required financing will only be mobilized when needed. The following Box 1 further provides worldwide examples where such a financing approach has been successful in the past:

Box 1: Sequenced Financing Approach for Large Hydropower Plants

Financing large hydropower plants (HPPs) is complex. High capital expenditure costs and long construction times are key financing challenges. The resulting interests during construction (IDC) can significantly increase the cost of the project when financing is committed before it is required. The owner/developer has to raise additional financing to cover those IDC. The higher loans in turn generate more IDC, therefore needing even higher amounts of financing. This creates additional financing challenges given the long gestation periods and are therefore even more pronounced for large sized and capital intensive HPPs. As a consequence, many large HPPs in the world are financed in a *sequenced* manner (see table below). In other words, the funding is raised when required. For instance, the Government of the People's Republic of China has provided annual financing from its budget for several large HPPs instead of raising all the financing upfront. Similarly the Government of Ethiopia is progressively raising bonds to finance the progress of the construction of the Grand Renaissance dam. As the table below shows, of the ten largest HPPs, eight have been constructed in more than one phase, thereby raising financing in sequences and using early generation as a source of income. Most large HPPs are publicly financed; financing on a pure private commercial basis (i.e. in form of Independent Power Producers (IPPs) has only been successful on a limited number of smaller HPPs with good sites. The larger the size of the project, the more likely they are to be financed publicly (i.e. public utilities secure the financing) and sequentially.

Name	Country	Installed Capacity(MW)	Years of completion
Three Gorges Dam	China	22,500	2003/2012
Itaipu Dam	Brazil/Paraguay	14,000	1984/1991, 2003
Guri	Venezuela	10,200	1978, 1986
Tucuruí	Brazil	8,370	1984
Grand Coulee	United States	6,809	1942/1950, 1973, 1975/1980, 1984/1985
Sayano–Shushenskaya	Russia	6,721	1985/1989, 2010/2014
Longtan Dam	China	6,426	2007/2009
Krasnoyarsk	Russia	6,000	1972
Robert-Bourassa	Canada	5,616	1979/1981
Churchill Falls	Canada	5,428	1971/1974

A.2 Financing to the Public Utility – WAPDA Hydel

5. This project is proposed to be implemented by WAPDA. This structure implies that WAPDA and ultimately the GoP as WAPDA's shareholder will take the completion risk of the project. The assumption of the completion risk by WAPDA has significant advantages for the overall financing strategy as an implementation of the project by the private sector would require the full financing being in place at the onset of the project and thereby prohibit a sequenced financing approach. It further would be difficult for a private investor to assume the completion risk of such a large infrastructure project with such a long implementation period. In addition, WAPDA through its corporate tariff regime will have an important revenue stream at its corporate level available during the construction period. Such recourse would neither be available to a private investor under the current tariff regime. For those reasons it is proposed that the financing for this project will be raised by WAPDA and further enhanced by GoP sovereign

guarantees, which would be backstopped by World Bank Guarantees in the base case scenario as further described below.

A.3 Financing Sources – Concessional and Commercial Funding

6. In the recent past, WAPDA relied essentially on concessional financing from bilateral and multilateral sources, supplemented with a limited amount of export credit, to finance its investment program. The magnitude of the required financing significantly exceeds the currently available funds under the World Bank Pakistan IDA lending envelope and also the current lending envelopes of other donors. As mentioned above under Section I.B of the PAD, Pakistan has been successful in the past in securing a number of commercial financings for large hydropower projects. While the terms of the commercial finance would undoubtedly be more onerous, analysis of WAPDA's future finances indicates that these would be affordable if the current tariff regime is maintained and implemented by NEPRA. Moreover, the additional debt service requirements in foreign exchange would be more than offset by the reduction in import requirements of fuel oil.

7. In addition, the mobilization of commercial funding sources becomes essential for the sector's overall generation expansion plans. According to Pakistan's National Power System Expansion Plan, conducted by NTDC, an estimated US$60-70 billion will be required over the next decade or so to meet the electricity deficit in the country. WAPDA's investment program alone, planned for the next 10 years, will already require some US$15 billion in investments. To mobilize this important capital requirement, WAPDA needs to not only maximize the use of concessional funds, but also tap a significant amount of commercial financing from international banks/capital markets. Likewise other sector institutions including PEPCO and NTDC also will need to increasingly rely on commercial financing resources to timely implement the proposed generation expansion plan. A successful mobilization of commercial funding through this Project will therefore support more broadly the sector's generation expansion plans and its ability to mobilize commercial financing solutions.

A.4 Credit Enhancement for Commercial Funding

8. The required financing for a significant part of the costs is expected to be denominated in foreign currency. In addition, the important amounts of capital to be raised need to be provided on a long term basis to allow WAPDA's cash flows to honor the debt service in each year of the financing, without putting too much pressure on WAPDA's and ultimately the energy sector's tariff requirements. The World Bank's recently conducted market soundings (see details further below) indicate that commercial lenders providing financing to WAPDA on a corporate basis, would require significant credit enhancement measures to their loans by a GoP sovereign guarantee and in the form of comprehensive political and commercial guarantee coverage against payment defaults by WAPDA.

9. Recent discussions with the Bank's CFP department, indicate that due to the limitation in the IDA policy, at this stage IDA can only extend $460 million (IDA funds of SDR 75 million, which is approx. equivalent to US$115 million at current exchange rate) of guarantee coverage in this IDA cycle ending on June 30, 2014. Therefore, financing will be mobilized in stages, each with support from IDA in the form of Guarantees not to exceed US$460 million within each replenishment period. Given those IDA limitations for extending political and credit risk coverage in form of IDA Guarantee to commercial lenders and also taking into account the potential volume of required commercial resources, IDA Guarantee coverage would need to be complemented with other guarantee/insurance instruments provided by other institutions.

10. On the basis of the current market soundings and due diligence, the team currently sees two potential additional sources for commercial and political risk coverage. Taking into account the potential contract sourcing allowing for a significant amount of works and goods export contracts to Pakistan, one

potential source for complementary insurance of commercial financing would be through Export Credit Agencies (ECAs). The second potential source of coverage would be a complementary MIGA insurance or a Loan Guarantee from another multilateral financing institution active in Pakistan.

11. In addition and while the main source of commercial funding would come from international commercial banks, another complementary source of commercial financing could also be in the form of direct ECA credit financing. A number of ECAs have funding windows, whereby they can lend directly to importers within the parameters of the OECD consensus[13]. While such funding sources would not be eligible for IDA Guarantee coverage, they have also been taken into account as potential option in the financing plan below.

A.5 World Bank Group collaboration on the DASU Financing Strategy

12. While developing this financing strategy the World Bank team has closely coordinated its financing approach with IFC and MIGA. The IFC is already significantly involved in Pakistan's energy sector. IFC has been supporting low cost generation using indigenous gas and hydro resources as well as promoting alternative sources (wind). IFC's current portfolio comprises: two private sector hydro projects- Laraib (84MW) & Star Hydro (147MW); one private power based on indigenous gas- Uch-II (404 MW); two wind projects- Zorlu (50MW); and Metro (50MW); and a waste to energy- KOEL (215MW). In addition, IFC has financed about 800MW of electricity generation for the first privatized integrated electricity utility (K-Electric).

13. With regard to potential future investments IFC is engaging with local and international sponsors (including Chinese and South Korean utilities), to finance private energy projects, including hydro, thermal. As part of its engagement with China Three Gorges, IFC is expected to mobilize substantial equity investment with international investors for the establishment of a platform company (China South Asia Investments Limited – CSAIL) to develop hydro, solar and wind power over the next five years. These efforts will leverage and mobilize significant capital to support the large pipeline of power projects in Pakistan. IFC is supportive of the development of Dasu and sees this as complementary to its own investment program in the power sector in Pakistan. IFC further values the complementarity of the World Bank engagement to its own strategy in developing future generation projects in Pakistan.

14. The Bank team and IFC further discussed the possibility for IFC to participate in the financing of the transmission line under this project, which could be concessioned to the private sector. While the Base Case funding structure currently foresees this part of the project to be implemented by NTDC and mainly financed by an IDA concessional credit, the IFC and World Bank teams will further discuss such an alternative scenario with WAPDA, NTDC and the GoP once the implementation of the project has started.

15. The World Bank team has also been in contact with MIGA about potential complementary insurance by MIGA. MIGA is also already actively engaged in Pakistan's power sector. Since 2012 MIGA is supporting Korea Water Resources Corporation (K-Water) and Daewoo Engineering & Construction (Daewoo) in Star Hydro Power Limited incorporated with a US$148.5 million MIGA Insurance. While MIGA has not yet issued a NHSFO insurance in Pakistan, the Bank team and MIGA agreed to further explore the deployment of MIGA's instrument in the context of this project.

[13] These are the arrangements on guidelines for officially supported export credits agreed between the members of the Organization for Economic Co-operation and Development (OECD). Consensus guidelines amongst other things define maximum tenors for loans and ECA coverage to be granted for export credits in certain countries.

B. DASU Financing Plan

16. On the basis of the key parameters of the Financing Strategy to this Project described in the previous section, the Bank team proposes to support this project with several IDA concessional credits and IDA Partial Credit Guarantees (PCG or Guarantees).

17. The Proposed IDA financing for the DHP-I (Base Case - Scenario A) is summarized below in Table 2. This includes an IDA credit of US$588.4 and an IDA guarantee of US$460 from IDA16 as proposed under this PAD. Those two instruments would be approved through this PAD.

18. This initial financing support would be followed by an IDA additional financing of US$533.4 million and another IDA guarantee addition financing of US$460 million next year from IDA17. This would mean a total IDA financing support of US$2,042 million (resulting in IDA country allocation used of US$1,352 million). If there is some gap in commercial financing another IDA guarantee may be considered for equipment and machinery etc. during IDA18 cycle.

Table 2: IDA Financing Support for DHP-I and IDA Allocation by IDA Cycle (US$ Million)

	IDA 16 Financing Support	IDA 17 Financing Support	Total IDA Financing Support for DHP-I	Total IDA to Country Allocation Used
IDA Credit (proposed)	588.4		588.4	588.4
IDA Guarantees (proposed)	460.0		460.0	115.0
IDA Credit AF (IDA 17)		533.4	533.4	533.4
IDA Guarantees AF (IDA 17)		460.0	460.0	115.0
TOTAL	**1,048.4**	**993.4**	**2,041.8**	**1,351.8**

19. In this Base Case scenario IDA credit funds would fund up to US$1,122 million of the Total Project Costs. In addition the Base Case assumes that up to US$920 million in IDA Guarantee cover will be able to mobilize up to US$2,400 million (US$1,900 of works with commercial financing and ECs US$546 million for equipment and machines) in commercial financing sources. The remaining balance of US$680 million of the Total Project costs in the Base Case scenario is going to be financed by WAPDA (US$600 million), NTDC (US$80 million). These are described in the following in more detail and the overview on the total costs and their financing by sub-component is given in Table 3 below.

a. First IDA Credit (US$588.4 million): This credit would be mainly used for preparatory works, implementation of social and environmental management plans, and construction supervision and management;
b. Commercial Financing is proposed of about US$1,900 million for main structure and power facilities (all works on the site) i.e. towards component A and B1. This needs to be mobilized about a year later when the contractors are appointed or nearly selected for such works. This commercial funding would be supported by IDA Partial Credit Guarantees;
c. Export Credit of up to US$546 million for supply and installation of machinery and equipment i.e. Component B2, which would be financed by ECAs directly and possibly with IDA Guarantee enhancement;
d. Second IDA Credit (US$533.4 million through AF): In the Base Case Additional Financing to the IDA Credit would be needed to fund parts of the components A and B but primarily component D related to the transmission line, which would also be funded by NTDC;
e. NTDC (US$80 million) would fund and implement component D1 related to construction of the Transmission line;

f. WAPDA Own funds (US$600 million): WAPDA would fund remaining costs of the social and environment plans (components E1 and E2), remaining preparatory works (component C) supervision and management of Phase-II of the project (components F1 and G1); main structure as well as power tunnels and power house i.e. components A and B.

Table 3 Project Cost by Component and Financing Sources

				Supported by IDA				
	Total Including Contingencies	IDA Credit (1)	WAPDA	Commercial Financing	Export Credits	AF to the IDA Credit	NTDC	Total Check
A. Main Structure	**1,479.7**	**10.0**	55.0	1,257.8		157.0		**1,479.7**
B. Power Generation Facilities								
B1 Powers House Civil Works, Intake, Pressure Tunnel underground substation etc	755.4		60.0	642.1		53.3		755.4
B2. Turbine, Generation and Related Equipment	642.4		49.3		546.0	47.1		642.4
Sub-total B	**1,397.8**	**0.0**	**109.3**	**642.1**	**546.0**	**100.4**		**1,397.8**
C. Preparatory and Other Works	**344.8**	**183.9**	**160.9**			0.0		**344.8**
D. Transmission Line (NTDC)								
D1. Construction cost	300.0					240.0	60.0	300.0
D2. Project Management and Supervision	10.0	10.0				0.0		10.0
D3. Social and Environmental Costs	40.0	5.0				15.0	20	40.0
Sub-total D	**350.0**	**15.0**				**255.0**	**80.0**	**350.0**
E. Implementaton of SAP and EMP, Dam Monitoring								
E1. Social Action/Management Plan (SAP)	438.9	201.5	237.4					438.9
E2. Environmental Management Plan (EMP)	54.5	54.5						54.5
E3 Watershed, sediment and River Monitoring Program	10.5	10.5	0.0					10.5
Sub-Total E	**503.9**	**266.5**	**237.4**			**0.0**		**503.9**
F. Consultancies for Supervision								
F1 Construction Supervision consulting services	91.1	45.0	25.0			21.1		91.1
F2 Project Mannagament M&E, supervision of EMP and SA	8.0	8.0						8.0
Sub-total F	**99.1**	**53.0**	**25.0**			**21.1**		99.1
G. Project Management, TA, Training								
G1 PMU support and audits, etc.	42.4	30.0	12.4			0.0		42.4
G2 Capacity building TA, POE, training	10.0	10.0						10.0
G3 Strategic studies and future project preparation	20.0	20.0						20.0
Sub-total G	**72.4**	**60.0**	**12.4**			**0.0**		**72.4**
Total	**4,247.7**	**588.4**	**600.0**	**1,899.9**	**546.0**	**533.4**	**80.0**	**4,247.7**

Note: Commercial Financing for works and export credits for equipment would be supported by IDA guarantees. The financing required is without interest during construction that would be financed from WAPDA revenue which it gets from works on progress allowed by NEPRA in the WAPDA Hydel Tariff.

C. Approach to Obtain Commercial Financing and Export Credit

C.1 Initial Market Soundings

20. As part of the project's due diligence, the Bank team started to explore, the support that could be provided by ECAs and commercial financiers, through initial informal market soundings. The Bank team held discussions with a number of commercial banks. The commercial banks that were contacted all

indicated an interest in providing financing for this project, though also indicated that substantial credit enhancement through an ECA or World Bank Guarantees would be required to minimize the uncovered commercial and political risk. In addition one commercial bank recently submitted a formal letter of intent to WAPDA to provide funding to this project on commercial terms subject to the availability of ECA coverage. Finally, the team has also started discussions with ECAs in the context of ongoing WAPDA procurements and initial indications have shown that a certain level of ECA coverage could be available.

21. While the initial market soundings have given the team sufficient comfort that commercial funding and ECA coverage for this project could be mobilized, the next stage in this commercial financing strategy implies, that more formal financing offers will be received by WAPDA from commercial financiers and ECA. The Bank team's recent due diligence though indicates that such financing offers may only be received, once WAPDA approaches the financing market with an official mandate and also with support from the World Bank through an approved financing strategy including World Bank Credit and Guarantees support. Approval for the initial World Bank Guarantee is therefore sought at this stage to subsequently allow the Bank team to position itself on the detailed financing support it will provide to the Project, and engage into active discussions with the relevant institutions (i.e. commercial banks, ECAs and equipment suppliers).

C.2 Bidding Strategy with Request for Funding Proposals

22. Pre-Qualifications (PQ) Process: The main contracts (main structure, power tunnels and power house, and equipment and machines) would be procured through International Competitive Bidding (ICB) procedure. Contractors would be informed early that they are expected to arrange these finances with the relevant commercial financiers and export credit agencies. In this case, the option for contractors to mobilize financing would be part of the PQ documents to first find out possible interest and scope. PQ of these contracts would be done with PQ conferences and the PQ may be adjusted after discussion with the interested contractors. The availability of IDA guarantees would be indicated in the PQ and bid documents -with more detail and evaluation criteria in the bidding documents. It is also planned that in parallel to the PQ conferences WAPDA and the Bank would carry out a roadshow to selective financial and equipment supplier centers to further explain the proposed IDA PCG support and carry out further due diligence on the Guarantees structuring requirements for the Bidding Stage.

23. PQ Evaluation: All bidders and their bids would have to be technically qualified to carry out the works and supply/install equipment, with required quality, experience, safety and past performance track record and timely delivery schedules for their financing offers to be considered. Bid evaluation will be made both with and without financing, with WAPDA and GoP reserving the option of substituting some of the financing from other sources. The detailed evaluation criteria would be further developed and fine-tuned and subsequently cleared with the Bank during project implementation in particular after the market feedback received during the PQ process.

24. Financing Structure adjustment and Bidding: At this stage and prior to the second phase of the bidding, the Bank team would process the proposed additional financing to this project to ensure that the finalized bidding structure and the required World Bank financing is in place for the final bidding round.

25. Guarantees negotiations: In a third stage, when the contractors' proposals are received and the contract selection is completed –on the basis among others on the ability of the contractors to raise financing-, the Bank will enter into final negotiations with the relevant export credit institutions and commercial financiers. The Bank team's approach to the financial structuring will be conducted on the basis as to minimize IDA coverage as much as possible. Finally, Annex 10 provides the draft Term Sheet for the Guarantees to be supported by this Project. This Term Sheet will be the basis for the Bank to undertake (i) formal market soundings, and (ii) discussions and negotiations for the proposed IDA Guarantees. If the terms and conditions of the guarantees that are ultimately negotiated with the

financiers are materially different from those that are outlined in the term sheet included in Annex 10 and that the Board of Executive Directors may approve, management will inform the Board of any such changes, before the Guarantee Agreements are signed.

26. Tentative Timeline: On the basis of the current timeline discussed with WAPDA, it is anticipated that the PQ process would be completed by the end of 2014 and the final bidding round would be launched in early 2015, thereby allowing for a financial closure of the commercial funding by mid-2015 in the base case scenario.

C.3 Potential IDA Guarantee Coverage and Alternative Guarantee Structures

27. The proposed Guarantee instrument to support this project would be a Partial Credit Guarantee which would cover commercial lenders against any debt service default by WAPDA under a commercial loan agreement. While the cover will be comprehensive for any risk that leads to debt service defaults, the coverage may be limited in time or volume of the overall credit amount and in any case could not exceed the maximum exposure approved through this PAD and any subsequent additional financing authorizations.

28. While the final details of the IDA Guarantee structure would depend on the outcomes of the bidding process as described above, it is currently envisaged in the Base Case, that IDA Guarantees could be used in two ways. The first way could be to cover in parallel with ECAs ("parallel coverage") throughout the life of the loans. The second way could be for ECAs to fully cover earlier years and for the IDA Guarantee to fully cover later years. This would allow extending tenor of the commercial loans ("extension of tenor"). The World Bank has experience with both models. While those initial coverage scenarios have been considered in the Base Case, other forms of coverage structures could also be envisaged, though always respecting the maximum exposure levels available and authorized by the IDA and under the principle of providing only as much coverage as need to leverage the required commercial funding.

D. Sustainability of the Proposed Financing Strategy

29. This strategy has important and High implementation risks, but the team has also identified specific mitigation measures as follows.

30. **Restriction of ECA exposures**: If commercial financing would be available for this project, but ECA coverage exposures may be more limited than currently assumed, three main mitigation measures are currently available:

(i) To compensate for ECA coverage shortfall, IDA would consider increasing its coverage of the respective commercial tranches up to the limits of the available IDA Guarantee envelope depending also on the IDA resources available within each IDA cycle.

(ii) The structuring of the underlying debt could be modified focusing on the debt repayment profile by back-ending certain principal payment obligations, which would increase the leverage of IDA's coverage amount in net present value terms.

(iii) The team's recently conducted market sounding included the assessment of potential new funding sources including the use of Islamic Finance.

31. **Commercial Financing Shortfall Risk**. This risk could materialize through lack of commercial financing available for the project, shorter tenors than anticipated, or both. Several alternatives exist if such financing shortfall occurs:

(i) **Lack of sufficient commercial amounts that can be raised on WAPDA's balance sheet**: an option could be to create a special purpose company, ring-fenced from WAPDA that would raise commercial financing on a project finance basis. The IFC may lend to such a structure and mobilize loans from other DFIs. MIGA could also provide support to private parties. This would be particularly feasible if the project is sufficiently advanced so that some of the earlier geology and construction risks are no longer substantial.

(ii) **Unfavorable financing conditions**: If the issue is short tenors, the loans could be structured with a put option. Lenders would have an option to refinance after a certain period and if they are not able to, a guarantor like IDA would buy back the loan. IDA guarantees for the Kribi gas power plant in Cameroon successfully used such structure with local banks.

(iii) **Additional Concessional Financing:** Alternatively, if, despite those above alternative structuring options, commercial funding for this project could still not be raised in sufficient amounts required, WAPDA and GoP may pursue financing from other development partners and the World Bank would also consider increasing the additional funding under the proposed additional financing to the project in FY16 or in FY17.

32. **Project Cost increases:** The Base Case assumptions on the Total Project Costs include a certain level of contingencies at a level usually applied for such types of project. In case of construction cost increases either one of the current three major funding sources (WAPDA, IDA concessional credit and Commercial Financing), could be considered for increasing contributions. While the availability of additional commercial funds may also depend on the availability of additional IDA Guarantees, WAPDA's own resources and additional IDA Financing resources would act as ultimate mitigation measures to cure any funding shortfall.

33. **Additional IDA Financing resources**: The World Bank country unit ensured it would provide priority to the project under future country allocations if needed. To ensure that at this stage it could be ensured that sufficient IDA resources would be available to cover any significant deviation from the Base Case financing plan, the Bank team has further calculated the financing requirements to fund this project with significantly higher concessional amounts in the absence of commercial funding resources. The Table 4 illustrates those alternative funding Scenarios B and C in addition to the earlier presented Base Case (Scenario A).

Table 4: Possible Alternative Financing Scenarios for DHP-I (US$ million)

Scenario	IDA Credits		IDA Guarantees to Support Commercial Financing and EC				WAPDA	NTDC	Total
	IDA credit (IDA 16)	IDA Credit AF (IDA 17)	IDA Guarantees (IDA 16)	IDA Guarantees (IDA 17)	Commercial Financing	Export Credits			
	A	B			C	D	E	F	A to F
Scenario A (Base Case)	588.4	533.4	460	460	1,900	546	600	80	4,248
Scenario B	588.4	1,315.7	460	460	1,118	546	600	80	4,248
Scenario C	588.4	2,658.1	161		-	321	600	80	4,248

(i) **Scenario B**, 50% commercial financing for works and 85% for equipment and remaining to be financed by WAPDA/IDA. In this case total IDA financing would be US$2,824 million with IDA Credit AF increased to US$1,316 million. This means IDA country allocation to be used during IDA17 would be US$1,431 million (including US$115 million IDA guarantee allocation) about 43%. In this case financing can be spread over IDA17 and IDA18 thus it would use 22% of IDA country allocation for IDA17 and IDA 18 cycles;

(ii) **Scenario C,** no commercial financing for works, only 50% commercial financial for equipment, and remaining to be financed by WAPDA/IDA. In this worst case scenario with regard to the non-availability of commercial funding, IDA financing of US$3,408 million with AF to IDA Credit increasing to US$2,658 million. This would result in IDA country allocation to be used of US$2,698 million (US$40 million use of IDA guarantee allocation) from IDA17 and IDA18. This is about 41% of expected IDA allocations for next two cycles.

34. Under Scenario C additional measures can be taken if necessary to reduce the IDA share to the project. Firstly, reduction of plant size to 1,080 MW generating over 8,000 GWhs annually as compared to 12,000 GWhs with 2,160 MW plant. This would still be economically very attractive option (with ERR of 21% as compared to 25%) and reduction of cost by about US$600 million. Secondly, the transmission line can be financed by another multilateral or bilateral development partners or IFC that has shown interest in financing it as mentioned previously above. These measures would reduce IDA share from 41% to 28% of future IDA allocation in the next two cycles. Further contribution by WAPDA can also reduce IDA share as its financial position gets better with: several ongoing hydropower plants coming on line in next few years; as WAPDA begins to get return on assets; and improved cash flows due to the escrow account as well as reduction in sector deficit with reforms envisaged under the Power DPC and IMF program.

35. The risks of this financing strategy are significant. The proposed mitigation measures offer clearways to address those risks upon their occurrence.

Annex 3: Implementation Arrangements
DASU HYDROPOWER STAGE I PROJECT (DHP-I)

1. Project Institutional and Implementation Arrangements

Project Administration Mechanisms

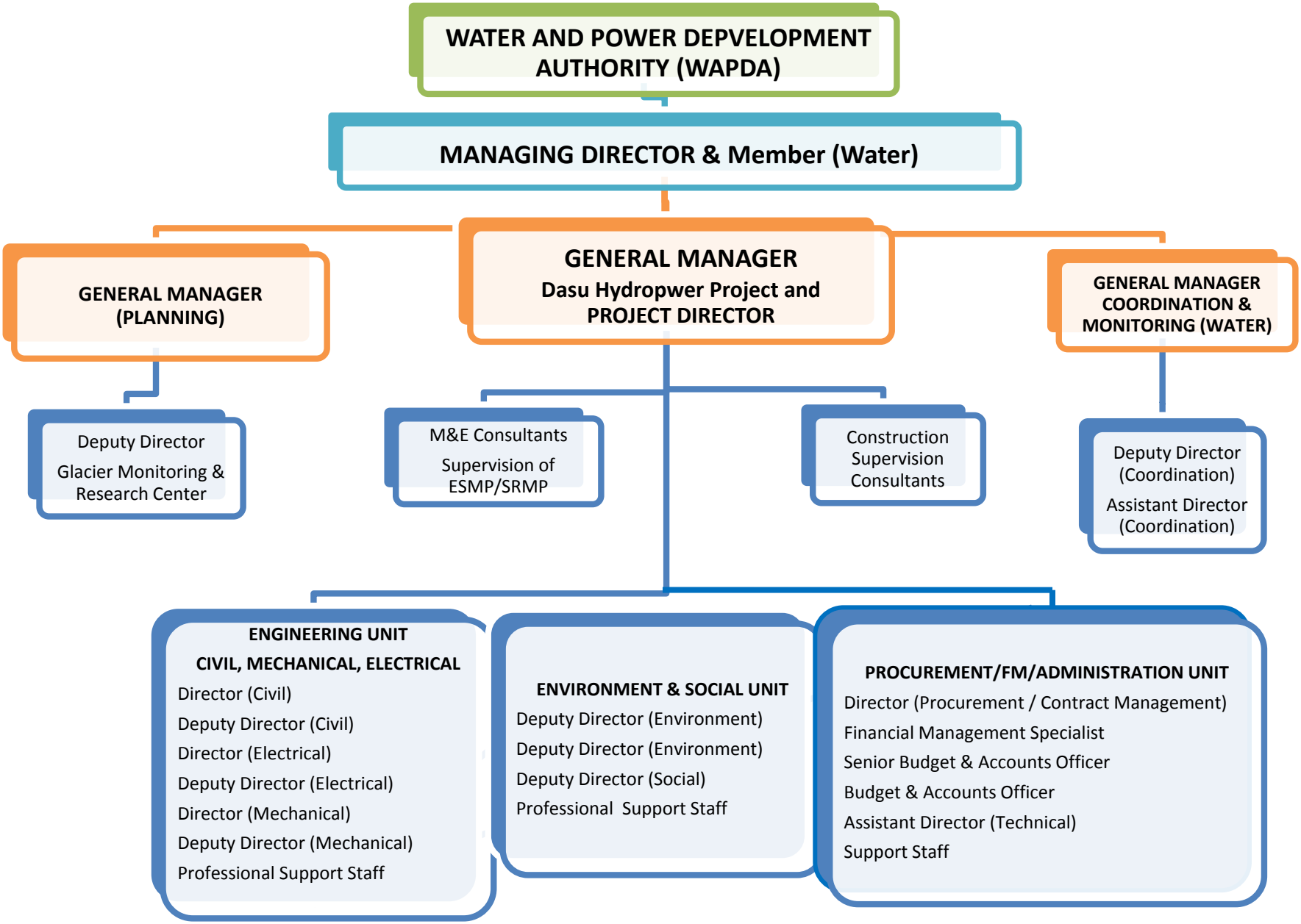
1. The **Water and Power Development Authority (WAPDA)** was created in 1958 through an act/ordinance as an independent Authority to provide for unified and coordinated development of the water and power resources of the country. The Authority consists of a Chairman and three members, each for Water, Power and Finance, who also act as Managing Directors of respective sections. WAPDA would be responsible for the execution and implementation of the Project through the Project Management Unit (PMU) established under General Manager (GM) Dasu Hydropower Project (DHP) office. The GM Dasu would report to the Member (Water). The PMU has been strengthened by providing additional staff. It would be supported by consultants, advisors and appropriate Non-Governmental Organizations (NGOs) for implementation of the Project. WAPDA would be responsible for relocation of the Karakoram Highway (KKH) in collaboration with the National Highway Authority (NHA).

2. **Project Management Unit (PMU).** The PMU, created within the GM DHP Office structure, would be responsible for all aspects of Project implementation and day-to-day operations and management. The Project implementation arrangements are given in Chart 1. The PMU would be headed by a GM DHP who would also be the Project Director of DHP. The PMU would be comprised of three units: (i) Engineering Unit, consisting of Civil works, Mechanical and Electrical works; (ii) Procurement, Financial Management and Administrative Unit; and (iii) Environment and Social Unit. Key specialists have been recruited, and staffing with qualified personnel is largely completed.

3. The PMU would be supported by two teams of consultants – Construction Supervision Consultants (CSCs) and Project Management Support and Monitoring and Evaluation Consultants (PM&ECs). The CSCs would help in construction supervision, contract management, and other management aspects of the Project. For civil works contracts, the Project Director (PD) would serve as the *Employer's Representative,* and the CSCs' supervising consultant would serve as the *Engineer* for construction supervision. At the site, *Resident Engineers,* appointed by the CSCs, together with a team of specialists and inspectors, would supervise the contractor. The PM&ECs would assist in Project management and monitoring and support the WAPDA in carrying out the role of employer. The PM&ECs would also supervise the implementation of the SRMP and EMP, and carry out independent M&E for Project activities and implementation.

4. The PMU headed by GM DHP would be responsible for direct implementation of all components of the Project through its engineering unit, with support from the CSC and M&ECs, except for Components D, and E3. Component D would be implemented by NTDC and Component E4 would be implemented by the GMRC established under the General Manager Planning of WAPDA and the Dams Monitoring Organization. The Environment and Social Unit would be responsible for implementation of EMP and SRMP.

5. The Project would be managed under the Water wing of WAPDA, under the overall management of Member (Water). Financial management of the Project would be the responsibility of the GM Finance (Power), under the overall supervision of Member (Finance) of WAPDA. After construction the project would be transferred to Power wing for operation.


WATER AND POWER DEPVELOPMENT AUTHORITY (WAPDA)
MANAGING DIRECTOR & Member (Water)
GENERAL MANAGER (PLANNING)
GENERAL MANAGER Dasu Hydropwer Project and PROJECT DIRECTOR
GENERAL MANAGER COORDINATION & MONITORING (WATER)
Deputy Director
Glacier Monitoring & Research Center
M&E Consultants
Supervision of ESMP/SRMP
Construction Supervision Consultants
Deputy Director (Coordination)
Assistant Director (Coordination)
ENGINEERING UNIT
CIVIL, MECHANICAL, ELECTRICAL
Director (Civil)
Deputy Director (Civil)
Director (Electrical)
Deputy Director (Electrical)
Director (Mechanical)
Deputy Director (Mechanical)
Professional Support Staff
ENVIRONMENT & SOCIAL UNIT
Deputy Director (Environment)
Deputy Director (Environment)
Deputy Director (Social)
Professional Support Staff
PROCUREMENT/FM/ADMINISTRATION UNIT
Director (Procurement / Contract Management)
Financial Management Specialist
Senior Budget & Accounts Officer
Budget & Accounts Officer
Assistant Director (Technical)
Support Staff

6. **National Transmission and Distribution Company (NTDC)** would be responsible for the implementation of the transmission line from Dasu to Islamabad (DTL) that is component D of the Project. The NTDC has established a Project Management Unit (PMU) for implementation of DTL and would be supported by the design and construction supervision consultants. From this Credit funds would be provided only for design of the transmission line and for meeting the social and environmental cost. The funds would be channeled through WAPDA PMU of DHP to NTDC's PMU for the Project.

Financial Management, Disbursements and Procurement

7. **Country Issues.** Pakistan has a three tier governance infrastructure for PFM that operates through the federal, provincial and district government(s). Finance Ministry/Department and line ministries/departments at federal and provincial level have well-defined roles and responsibilities for budget formulation and execution. Controller General of Accounts (CGA), a representative of federal government, through its associated offices across the country pre-audit the transactions, make payments and thereafter prepare financial statements. Auditor General of Pakistan (AGP) being the Supreme Audit Institution of the country is bestowed by the Constitution to conduct audit of federal, provincial and district government entities.

8. In June 2012, a Public Financial Management and Accountability Assessment was finalized for the Federal Government using the PEFA14 Performance Measurement Framework. This was a repeat assessment with a baseline established in 2009. The report noted positive progress as a result of ongoing reforms for improving public financial management (PFM). Budgeting, accounting and financial reporting have been automated at the federal, provincial and district level through the nation-wide implementation of National Financial Management Information System (National FMIS) using the sophisticated SAP application with a uniform chart of accounts that is compliant with international classification standards namely UN COFOG15 and IMF GFSM16. Connectivity is in place for all line ministries/departments to monitor budget execution on a real time basis. Government has introduced a Medium Term Budgetary Framework (MTBF) to bring a multi-year perspective in planning and budgeting. Annual audits are completed in time using international standards and audit reports are presented to the legislature within eight months of the end of the fiscal year. Progress on transparency through public availability of financial information is also noteworthy.

9. The assessment, however, identified certain areas for improvement to achieve better PFM outcomes. For improved budget credibility, the government needs to institutionalize MTBF. For better expenditure control, the commitment accounting functionality available within National FMIS needs to be utilized. The Government also needs to develop an effective internal audit function and continuing efforts are needed to improve effectiveness of tax collection and the management of cash balances impacting the predictability of availability of funds.

10. **Financial Management in WAPDA.** WAPDA is an autonomous organization established under The Pakistan Water and Power Development Authority Act, 1958, which gives WAPDA the powers to define its own accounting policies and procedure. The country systems are not extended to WAPDA, except for budgeting and auditing.

11. WAPDA's financial management function is headed by Managing Director/Member (Finance) who is also a member of the Authority. Day-to-day management of the financial management function is

[14]Public Expenditure and Financial Accountability (PEFA). The PEFA Program was established in December 2001 as a multi-donor partnership between the World Bank, the European Commission, the UK's Department for International Development, the Swiss State Secretariat for Economic Affairs, the French Ministry of Foreign Affairs, the Royal Norwegian Ministry of Foreign Affairs, and the International Monetary Fund. The PEFA PFM Performance Measurement Framework was issued in June 2005 and updated in 2011.

[15] United National Classification of Functions of Government

[16] International Monetary Fund - Government Financial Statistics Manual 1986

carried out by the General Managers posted in different wings of the Authority; GM Finance (Water) heads the FM function in Water wing and GM Finance (Power) in the Power wing.

12. The Power and Water wings of WAPDA function independently of each other and the financial management practices in both wings differ. Presently, consolidated financial statements of WAPDA are not prepared, each wing prepares separate financial statements. However, an un-audited consolidated balance sheet of WAPDA is presented in WAPDA's annual report. There is an opportunity to improve the overall financial management within WAPDA, by both wings sharing good practices and learning from each other. For instance, the Power wing has successfully implemented accounting software that can be extended to the Water wing. WAPDA employs a large number of financial management staff (about 700) but does not have any capacity development plan to build a cadre of staff with full complement of finance/ financial management skills, needed to raise and manage finances for water & power sector development.

13. Recently, WAPDA has taken certain initiatives to improve its financial management. Budgeting, Accounting and Internal Audit manuals are being revised and it is expected that the revised manuals will be applicable from 2015. In January 2014, WAPDA approved a four year plan to strengthen its internal audit division and make it compliant with international standards. Approval of the internal audit strengthening plan was a legal covenant of the Bank-financed Tarbela Fourth Extension Hydropower Project being implemented by WAPDA. The Bank will monitor progress against implementation of the internal audit strengthening plan during supervision of Tarbela and Dasu projects.

14. **Project FM Risk.** The financial management risk of the project is assessed "Substantial" because some of the agreed financial management arrangements will be implemented after project effectiveness. However, this risk is partly mitigated by the fact that WAPDA has significant experience of implementing large infrastructure and donor financed projects. The financial management risk will be reassessed once the agreed financial management arrangements are in place.

15. **Staffing.** The General Manager Finance (Power) will have overall responsibility to oversee the financial management of the Project. However, the deployment of financial management staff for Dasu PMU will be coordinated by the GM Finance (Water). The financial management team at Dasu PMU will be headed by a Director (Budget & Accounts) who will be assisted by a Senio. Budget & Accounts officer and few support staff. In total, seven positions have been approved in the PC-I for the project's FM unit, which is acceptable to the Bank. The FM Staff will be appointed from the existing financial management staff. The Bank will prior-review the CVs of Director (Budget & Accounts) as well as Senior Budget & Accounts Officer. The FM Staff has been posted and WAPDA will ensure that FM Staff remains posted for at least three years. This is important per experience with the Tarbela Forth Extension Hydropower Project, where the FM Staff turnover impacted project FM performance. However, unlike Tarbela, Dasu PMU will be located in WAPDA Head Quarters, Lahore, where a pool of qualified and experienced FM Staff is available.

16. **Budgeting.** Government of Pakistan will allocate funds for the project activities in the annual Public Sector Development Program (PSDP). Furthermore, the project will be reflected in the Federal government's annual budget as a part of the budget of Ministry of Water & Power. Dasu PMU will prepare annual budget estimates based on the budget requirements in the approved PC-I. WAPDA's Budget Manual, relevant directives issued by WAPDA as well as the government instructions will be followed for budget preparation. For each financial year, Dasu PMU will prepare a work plan providing quarterly breakdown of activities and a corresponding cash plan. The annual budget for the project will be consolidated into the overall WAPDA budget. The Authority comprising WAPDA Chairman and Members will review and approve the budget estimates before forwarding them to the Ministry of Water and Power. Dasu PMU will share the annual work plan and cash plan with the Bank two months before the start of the financial year.

Table 3.1 – Budget Preparation Milestones for Each Financial Year

Milestone	Due Date	Responsibility
Preparation of work plan and cash plan for the next financial year starting from July and submission to WAPDA	Jan 31	Project Director and Director (Budget & Accounts)
Approval of project work plan and cash plan	Feb 28	Authority comprising WAPDA Chairman & Members
Submission of budget estimates to Ministry of Water & Power as part of overall WAPDA budget	Mar 31	Authority comprising WAPDA Chairman & Members

17. **Funds Flow and Disbursement Arrangements**. The project will mainly use the Advance and Direct Payment method of disbursements. For receipt of advance from the Bank, WAPDA will open a segregated Designated Account (DA) in US Dollars at the National Bank of Pakistan. WAPDA PMU will operate the DA in accordance with the provisions of "Revised Accounting Procedure for Revolving Fund Account (Foreign Aid Assignment Account)" issued by the Finance Division, Government of Pakistan. The Bank will disburse advances into the DA upto a ceiling of 6 months/ two quarters cash forecast of the project. For the initial advance into the DA, DHP PMU will provide the cash forecast for the first two quarters to the Bank. The amount of subsequent advances will be based on available cash balance and cash forecast for the following two quarters as reported in the quarterly Interim Financial Reports (IFRs). For each calendar quarter, starting with the calendar quarter during when the project becomes effective, WAPDA PMU will submit Interim Financial Reports (IFRs) to the Bank on the agreed format, within 45 days of the close of the quarter. On the basis of IFRs, the Bank will also document the expenditure incurred against advances disbursed into the DA.

18. The project implementation arrangements require transfer of funds to Project Manager (PM) NTDC, and Deputy Commissioner (DC) Upper Kohistan for implementation of certain project activities; details are provided in the following table:

Table 3.2 – Advances from Designated Account

Advances To	*Purpose*	*Ceiling*	*Accounts to be Maintained*	*Adjustment of Advance*
Deputy Commissioner – Upper Kohistan District	Resettlement Payments to project affectees as per SRMP	90 days rolling based on list of affectees to be paid	- Cash Book - Payment Vouchers	Monthly - expenditure summary and copies of vouchers to be sent to the PMU
Project Manager – NTDC	Preparatory works related to transmission line including SRMP implementation	90 days rolling advance	- Cash Book - Payment Vouchers	Monthly - expenditure summary and copies of vouchers to be provided to the PMU

19. DHP PMU would advance DC Upper Kohistan and PM NTDC, an amount equal to the 90 days budgeted expenditures related to the project and would replenish the account at the end of each quarter on a revolving basis. Each of the entities will open a segregated account for receipt of funds from Dasu PMU and will nominate their respective authorizing officers for the purpose of approving expenditures related to the project activities. A simplified imprest account shall be maintained by the responsible officials of these entities in a manner adequate to render the classified account to DHP PMU on monthly basis for preparation/consolidation of the project financial reports. Certified cash book and vouchers for the expenditures incurred will be kept by the respective entity for the purposes of annual audit. Bank procurement guidelines will apply for any procurement to be carried out by these entities. Large payments (US$ 50,000 or above) under the components implemented by the above mentioned entities will be made by the Dasu PMU upon request of the respective entity.

20. For large civil works and consultancy payments where the payments are relatively large and are in foreign currencies, direct payment method will be used. DHP PMU will submit a Withdrawal Application along with supporting documents and the Bank will disburse funds to the supplier or contractor. The minimum value for direct payments will be documented in the disbursement letter. For direct payments, the Bank will require certified copies of the original records at the time of the request for payment. The allocation of IDA Credit proceeds is provided in Table 3.3.

Table 3.3 – Allocation of Credit Proceeds (US$ Million)

Expenditure Category	IDA Amount Hard Term	IDA Amount Blend Term	Percentage of Expenditures to be Financed
1. Goods, works, consultants' services, non-consulting services, Training and Workshops, and Incremental Operating Costs under Components A, C, D, E, F and G of Project	190.3	287.1	100%
2. Land Acquisition & Resettlement Compensations under Component E.1 and D of the Project		111	100%
Total	**190.3**	**398.1**	

Note: Total IDA is US$588.4 million equivalent. The financing is inclusive of import duties and taxes. Though IDA will not finance the entire budget of each of the expenditure types in Table 3.3 above, given the liquidity constraints that WAPDA faces, availability of funds from commercial lenders or Export Credits, and the desired flexibility of IDA funding, IDA financing percentage for the various expenditure types will be at 100% up to the allocated amount in each of the disbursement categories. Bank task team's approval of the amount claimed and financing percentage applied in each of the withdrawal application will be required before WA is processed for disbursements.

Category 2 expenditures not to exceed US$111 million US$75 million for land properties, and US$36 million for structures, livelihood restoration and other resettlement related assistance to be used in first two years of the project.

21. **Retroactive Financing.** Retroactive financing of up to US$113 million for payments made against eligible expenditures incurred from November 1, 2013 to the Credit signing date will be allowed provided that the procurement procedures are acceptable to the Bank. These funds can be used for financing the preparatory works and implementation of social and environmental costs that are procured and implemented using the World Bank Guidelines. To claim retroactive financing, Dasu PMU would be required to furnish an Interim Financial Report for the retroactive financing period as well as the supporting documents requested by the Bank.

22. **Incremental Operating Costs** will cover incremental staff salaries, per diem and allowances, office rent, office supplies, utilities, conveyance, travel and boarding/lodging allowances, operating and maintenance expenditures of office equipment and vehicles, bank charges, insurance, advertising, media projections, newspaper subscriptions, periodicals, printing and stationary costs, incurred for the purposes of project activities which would not have been incurred in the absence of the project. Incremental Operating Costs exclude salaries, fees, honoraria, bonuses, and any other salary supplements of members of the Recipient's (GoP) or the Project Implementing Entity's (WAPDA) civil service.

23. **Re-lending to WAPDA.** The IDA Credit proceeds would be re-lent by GoP to WAPDA through a subsidiary loan agreement, on the terms agreed with the Bank. The GoP would authorize WAPDA to withdraw the proceeds of the IDA Credit and proceeds withdrawn by WAPDA would be considered withdrawn by GoP.

24. **Accounting.** Dasu PMU will maintain the project accounts on accrual basis per WAPDA accounting policies and procedures as defined in the WAPDA Accounting Manual and WAPDA Chart of Accounts. The books of accounts will be maintained in Pak Rupee as well as US Dollar. Payment vouchers will be prepared for each transaction and the relevant accounting codes, disbursement category and project component will be stated on the payment vouchers. Accounts will be maintained on accounting software implemented in the Power wring, including Cash Book and General Ledger functionality. In addition, the following records will be maintained manually:

a. Compensation Register – to record details of PAPs and compensation payments
b. Asset Register – to maintain up-to-date record of assets procured form credit proceeds
c. Invoice Register – to track payments and processing time
d. Contract Register – to record contractor/consultant wise details of contract value and payments

25. In accordance with the requirements of "Revised Accounting Procedure for Revolving Fund Account (Foreign Aid Assignment Account)", Dasu PMU will provide the following records to the Accountant General Pakistan Revenue (AGPR):

a. Details of checks issued from the DA – daily basis, only on those days/dates during which checks are issued by Dasu PMU.
b. Details of direct payments to the contractors/ suppliers by the Bank – after the Bank has made payment to the contractor/ supplier on the basis of withdrawal application.
c. Monthly Statement of Account – providing details of receipts and payments for the month.

26. **Internal Controls.** A significant portion of the financing under Phase I of the project will be spent to implement the SRMP, including compensation payments to Project Affected Persons (PAPs). Land Acquisition Act, 1894 provides the regulatory framework for the land acquisition which makes the provincial government responsible for land acquisition. District administration as representative of the provincial government will manage the land acquisition and transfer in the name of WAPDA. The land/property purchase and compensation payments would be made according to the procedures and estimates agreed under SRMP. All single compensation payments of above US$ 50,000 will be prior-reviewed by the Bank. There is risk that compensation payments may be made at rates lower than those agreed in SRMP and to persons who are not affected by the project. To mitigate these risks, the following internal controls have been agreed:

a. Dasu PMU to maintain an updated list of PAPs on WAPDA's website (www.wapda.gov.pk) providing particulars of the project affected person, total compensation payments to be made as per SRMP, payments made to date and outstanding balance.
b. Monitoring & Evaluation firm to conduct a quarterly review that compensation payments have been made in accordance with SRMP. Dasu PMU to share the reports of the review with the Bank.
c. WAPDA's internal audit division to conduct semi-annual internal audits of compensation payments. Internal auditors will have access to the relevant records at Dasu PMU as well as office of the DC Upper Kohistan. Chief Auditor WAPDA to share the internal audit reports with the Bank.

27. The project also involves few goods, consultancies and works contracts of large amounts where the World Bank procurement Guidelines will be followed. WAPDA PMU will be supported by a Construction Supervision Consultant (CSC) who will verify all invoices of works before payment is

made. Director Procurement/Contract Management will have the primary responsibility for contract management. He will report progress against each contract in the project's quarterly progress reports. The Director will also verify all consultant/contractor invoices for compliance with the contract.

28. WAPDA Book of Financial Powers describes standard processes, minimum documentation and approval limits for processing different types of payments, which will be used by the project. Internal control activities for the project will at minimum include the following:

(a) ***Authorization and Approvals:*** Financial authority to approve payments shall vest with the Project Director or an official as delegated by WAPDA in accordance with WAPDA Book of Financial Powers.
(b) ***Verifications:*** For each payment the FM section shall perform a reasonableness check that the payment claim is appropriately supported by documents, is in compliance with approved policies and has been approved by a competent authority.
(c) ***Segregation of Duties:*** FM function will be independent of procurement and administration. The Project will have dual bank signatories, one of which will be from a unit other than FM.
(d) ***Physical Controls:*** The Project will maintain a fixed assets register for assets procured from credit proceeds and all assets will be tagged and periodically verified.
(e) ***Periodic Reporting:*** The Project will prepare Interim Financial Reports and Progress Reports on a quarterly basis and Financial Statements as well as Annual Report annually.
(f) ***Reconciliations:*** Expenditure reconciliation with Accountant General and bank reconciliation will be carried out on a monthly basis. Implementing entities maintaining a rolling advance will also report and reconcile their expenditure with Dasu PMU on a monthly basis.
(g) ***Internal Audit:*** WAPDA's internal audit division will carry out the project's internal audit semi-annually, covering the entire project activities. Annual internal audit plan of the project for each year will be agreed with the Bank two months before the start of the audit year. Chief Auditor WAPDA will share the semi-annual internal audit reports of the project with the Bank.

29. **Financial Reporting.** For each calendar quarter, WAPDA PMU will prepare and furnish to the Bank the Interim Financial Reports (IFRs) within 45 days of the close of the quarter. IFRs will include details of sources and uses of funds, expenditure details by disbursement categories, opening and closing cash balances, and cash forecast for the next two quarters. IFRs will also include a statement of compensation payments providing details of particulars of the project affected person, total compensation payments to be made as per SRMP, payments made to date and during the quarter, and outstanding balance at the end of the quarter. The format of the IFRs will be agreed during project negotiations.

30. **Auditing.** The Directorate General Audit (WAPDA), representing Auditor General of Pakistan, conducts annual audit of WAPDA Power Wing. Mainly regularity audit is carried out and the Director General Audit (WAPDA) does not express an opinion on the financial statements of WAPDA Power Wing. The audit for the financial year 2012-13 has been completed and the audit report of the latest financial year has been submitted to the legislature.

31. As per directions of NEPRA, annual financial statements of WAPDA Power Wing (Hydro Electric) are audited by a firm of Chartered Accountants. The financial statements have been prepared according to International Financial Reporting Standards (IFRS). For the ongoing Bank financed Tarbela Fourth Extension Hydropower Project, WAPDA furnishes audited financial statements of WAPDA Power Wing (Hydro Electric) to the Bank that includes additional disclosure of project operations, resources and expenditure. The Bank has received acceptable audited financial statements in respect of Tarbela Project upto the financial year 2012-13. There are no overdue audit reports or ineligible expenditure.

32. Dasu project will be audited by a firm of Chartered Accountants with terms of reference acceptable to the Bank, as part of the annual audit of WAPDA Power Wing (Hydro Electric). Audited Financial Statements, prepared in compliance with IFRS, along with the Management Letter issued by the Auditors will be submitted to the Bank within six months after the close of the fiscal year.

Audit Report Type	**Due Date**
Entity Financial Statements of WADPA Power Wing (Hydro Electric) for Financial Year ended June 30 each year (including disclosure of operations, resources and expenditures of the project) as well as Management Letter issued by the Auditors.	December 31 each year.

33. **Supervision Strategy.** The Bank will carry out filed supervision every six months. During the first year of the project implementation, the Bank will also provide technical support in implementing the designed financial management arrangements. In addition to the periodic supervision missions, the Bank would review quarterly IFRs and progress reports, semi-annual internal audit reports and annual audited financial statements. The Bank's financial management specialist based in the Country Office in Pakistan would be available to discuss financial management issues with the DHP PMU, as and when needed.

34. **Agreed Actions**

- **a.** WAPDA will devise Standard Operating Procedures (SOPs) for compensation payments that will be agreed with the Bank prior to disbursements;
- **b.** The Bank will prior review the CVs of Director (Budget & Accounts) and Budget & Accounts Officer to be posted at Dasu PMU.
- **c.** WAPDA's internal audit division will conduct semi-annual internal audits of the project including compensation payments. Annual internal audit plan of the project will be agreed with the Bank two months before the start of the audit year. Chief Auditor WAPDA will share the semi-annual internal audit reports with the Bank.
- **d.** Dasu PMU will maintain an updated list of PAPs on WAPDA's website (www.wapda.gov.pk) providing particulars of the project affected person, total compensation payments to be made as per SRMP, payments made to date and outstanding balance.

Procurement

35. Procurement for the proposed Project would be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated January 2011 (Procurement Guidelines); and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated January 2011 (Consultant Guidelines) and the provisions stipulated in the Financing Agreement. However, the procurement of works, goods and services contracts not financed by the World Bank may be financed following the procurement guidelines of the financers of such contracts. In this context an understanding/agreement would be reached between World Bank and WAPDA/NTDC and the procurement packages would be defined that would be financed by other financer's including the process, nature of bidding and timeline for procurement and completion in order to synchronize them with the project implementation and overall project completion. All expected major procurement of works and consultants' services has been announced in the General Procurement Notice (GPN), published in the dgMarket and United Nations Development Business (UNDB).

36. **Special Measures for Dealing with Procurement Risks.** In order to minimize procurement risks several measures are introduced for procurement in general and for management of consultancy contracts in particular. These measures are outlined below.

37. WAPDA and NTDC have conducted a number of large civil works projects using ICB procedures of various funding agencies. The staff in general is well versed with good procurement and contract management practices. The PMUs in WAPDA and NTDC through their procurement unit shall be responsible for carrying out the procurement under the Project including the consulting services, works and goods. The PMUs staffed by the Procurement and contract management specialists, with support of the consultants shall also: (i) develop a procurement website which would be managed and updated; (ii) develop a credible system for handling procurement related complaints; and (iii) develop and maintain a system of procurement documentation, filing systems and procurement database.

38. The PMUs' **procurement website** would be used for providing a procurement plan, procurement notices, invitations to bid, bid documents and requests for proposals as issued, latest information on procurement contracts, status of evaluation, complaints and actions taken, contract award and performance under the contracts and other relevant information related to procurement. The website would be accessible to all bidders and interested persons free of charge. The website would be supported by a filing system and a procurement database as explained below. Currently all procurement notices are posted on WAPDA's website; a Project link shall be fully functional by the finalization of the pre-qualification process of the two major works contracts. NTDC would also establish a website September 30, 2014 and post all procurement notices as done by WAPDA.

39. A **credible system of handling complaints** would be put in place. The PMUs would manage the complaint handling system with overall oversight by WAPDA and the MoWP. This system would include maintenance of a database, a standard protocol with appropriate triggers for carrying out investigations and taking action against involved parties. For ICB/international selection of consultants the Bank prescribed complaint redressal mechanism would apply.

40. **A procurement documentation system,** filing system and a procurement database would be developed and maintained for all the procurements and contract management documents, bids, bid evaluations, communication with bidders, complaints, their redressal, and other related management issues. A procurement manual would be prepared, documenting the procurement processes and approval procedures for each agency responsible for procurement under the Project, circumscribing roles and responsibilities, and service delivery standards.

41. The Bank would hold procurement training for the PMUs staff for works, goods and services after the credit negotiations. With these arrangements, the procurement under the Project is likely to be effective and transparent resulting in smooth implementation of the Project and achievement of the PDOs.

42. **Procurement of Works.** Much of the Project civil works and electro-mechanical works would be procured through ICB procedures. The Project is likely to have four packages for construction as described below. Pre-qualifications of contractors and suppliers would be carried out for all of these major:

(i) **Package 1:** All civil works related to construction of the main structure covering construction of the river diversion, main structure, LLOs, spilways, gates, and all other ancillary works. This would be primarily Component A of the project;
(ii) **Package 2:** All works related to power generation facilities --waterways to power house, power tunnels, power house, penstock, connection of the tunnel to the power house etc. This would be primarily Component B1of the Project;
(iii) **Package 3:** Covering supply and installation of turbines, generators, electrical systems, and all ancillary works within the power house. This would be primarily Component B2 of the Project also covering transformers, electrical connection and other facilities outside the power house; and
(iv) **Package 4:** Construction of 500 KV Dasu Transmission Line (DTL) from Dasu to Islamabad.

43. The preparatory works would be funded under the first IDA credit (Component C). and the following would be the ICB contract packages:

(a) Package (PW1) Transmission line from Dubair to Dasu;
(b) Package (PW2) KKH1 relocation of about 16 km of KKH to higher elevation around the site of the main works, and access roads for construction on the right side of the river;
(c) Package (PW3) Office buildings, colonies and essential building; and
(d) Package (PW4) KKH2 relocation of remaining KKH about 48 km to a higher elevation

44. **Approach to Obtain Commercial Financing and Export Credit.** The approach to obtaining commercial financing for works as well as to getting export credits for equipment and machinery would be to incorporate mobilization of financing by the interested contractors in the bidding process for the three main contracts (main structure, power tunnels and power house, and equipment and machinery) that would be procured through International Competitive Bidding (ICB) procedure. In this case the option for contractors to mobilize financing would be made part of the pre-qualification process to first find out possible interest and scope. Pre-qualification (PQ) of these contracts would be done with pre-qualification conferences and the PQ could be adjusted after discussion with the interested contractors. The availability of IDA guarantees (to increase the loan tenors) would be indicated in the bid documents. Bids would be evaluated both with and without financing, with WAPDA reserving the option of substituting some of the financing from other sources. Package 1 and 2 would be procured using the slice and package approach allowing bidders to bid on one or both contracts. The final bidding criteria would be finalized/adjusted after the feedback from the market during the PQ process.

45. Based on the recent experience with Tarbela, which involved similar construction albeit the contracts were smaller at about US$300 million, major contractors from at least five to six countries are expected to participate in the bidding. This would offer the possibility of mobilize funding from several sources; in particular if the joint venture (JVs) partners are from more than one country, which is likely. Also, this would ensure least cost and most competitive financing arrangements for the project. The civil works contracts would be procured as follows:

(i) Estimated to cost more than US$6 million equivalent would be procured through ICB procedures. Pre-qualification would be mandatory for contracts estimated to cost more than US$10 million equivalent
(ii) Estimated to cost less than US$6 million equivalent would be procured through National Competitive Bidding (NCB) procedures using the bidding documents as approved by the Bank
(iii) For minor works estimated to cost up to US$100,000 equivalent per contract may be procured through shopping procedures. The PMU would validate authenticity of the quotations provided by suppliers under this procedure
(iv) Works up to US$100,000 equivalent where suitable and needed may be carried out through community based contract procedure, using contract format(s) as agreed with the Bank.

46. It is further proposed that the procurement process for contracts entirely financed by commercial lenders with no IDA credit financing but supported by IDA Guarantees, would have to follow at the minimum the World Bank's guidelines for procurement under loans guaranteed by the Bank[17].

47. **Procurement of Goods.** Goods procured under this Project would include: dam and glacier monitoring equipment, office equipment, vehicles, furniture, field equipment and heavy equipment. The following procedures would apply for procurement of goods:

(i) ICB procedures shall be followed for each Goods contract estimated to cost more than US$1,000,000 equivalent. Domestic Preference would be given to local manufacturers on ICB contracts

[17] Paragraph 3.18 of the Guidelines Procurements of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011.

(ii) Goods estimated to cost up to US$1,000,000 per contract may be procured through NCB procedures acceptable to the Bank;
(iii) Vehicles, regardless of cost; and small value off-the-shelf goods etc., estimated to cost up to US$100,000 equivalent per contract may be procured following shopping procedures in accordance with the Bank's procurement guidelines.
(iv) Computer software, books, journals, training material, and other specialized equipment and goods may be procured following direct contracting procedures, with prior approval of the Bank.

48. **Improvement of Bidding Procedures under National Competitive Bidding.** The following improvements in bidding procedures would apply to all procurement of Goods and Works under NCB, in order to ensure economy, efficiency, transparency and broad consistency with the provisions of Section 1 of the Guidelines:

(i) Invitation to bid shall be advertised in at least one national newspaper with a wide circulation, at least 30 days prior to the deadline for the submission of bids;
(ii) Bid documents shall be made available, by mail or in person, to all who are willing to pay the required fee;
(iii) Foreign bidders shall not be precluded from bidding and no preference of any kind shall be given to national bidders in the bidding process;
(iv) Bidding shall not be restricted to pre-registered firms;
(v) Qualification criteria shall be stated in the bidding documents;
(vi) Bids shall be opened in public, immediately after the deadline for submission of bids;
(vii) Bids shall not be rejected merely on the basis of a comparison with an official estimate without the prior concurrence of the Bank;
(viii) Before rejecting all bids and soliciting new bids, the Bank's prior concurrence shall be obtained;
(ix) Bids shall be solicited and works contracts shall be awarded on the basis of unit prices;
(x) Contracts shall not be awarded on the basis of nationally negotiated rates;
(xi) A single bid shall also be considered for award;
(xii) Contracts shall be awarded to the lowest evaluated and qualified bidder;
(xiii) Post-bidding negotiations shall not be allowed with the lowest evaluated or any other bidders;
(xiv) Draft NCB contract shall be reviewed by the Bank in accordance with the prior review procedures;
(xv) Government-owned enterprises shall be eligible to bid only if they can establish that they are legally and financially autonomous, operate under commercial law, and are not a dependent agency of the Recipient;
(xvi) A firm declared ineligible by the Bank, based on a determination by the Bank that the firm has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for or in executing a Bank-financed contract, shall be ineligible to be awarded a Bank-financed contract during the period of time determined by the Bank;
(xvii) The Bank shall declare a firm ineligible, either indefinitely or for a stated period, to be awarded a contract financed by the Bank, if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a contract financed by the Bank; and
(xviii) Each contract financed from the proceeds of a Credit shall provide that the suppliers, contractors and subcontractors shall permit the Bank, at its request, to inspect their accounts and records relating to the performance of the contract and to have said accounts and records audited by auditors appointed by the Bank. The deliberate and material violation by the supplier, contractor or subcontractor of such provision may amount to obstructive practice.

49. **Recruitment of Consultants.** Major consulting services under the Project would be required for CSCs, and M&ECs, capacity building, and strategic studies and future project preparation. Contracts with consulting firms would be procured in accordance with Quality and Cost Based Selection procedures or

other methods given in Section III of the Consultants' Guidelines, such as quality based (QBS), fixed budget (FBS), least cost selection (LCS), consultants qualification (CQS) or single source selection (SSS). For contracts with consulting firms estimated to cost less than US$500,000 equivalent per contract, the shortlist of consultants may comprise entirely national consultants in accordance with the provisions of paragraphs 2.7 of the Consultant Guidelines.

50. **Selection of Individual Consultants.** The World Bank provides guidelines on selection of individual consultants in Section V of the Consultant Guidelines. Services for assignments that meet the requirements set forth in the first sentence of paragraph 5.1 of the Consultant Guidelines may be procured under contracts awarded to individual consultants in accordance with the provisions of paragraphs 5.2 through 5.3 of the Consultant Guidelines. Under the circumstances described in paragraph 5.4 of the Consultant Guidelines, such contracts may be awarded to individual consultants on a sole-source basis.

51. **Single-Source Selection.** Specific consultants' services through firms, satisfying Consultants Guidelines (paragraph 3.9 to 3.11), with Bank's prior agreement may be procured following single source selection procedures.

52. **Incremental Operating Costs.** The incremental operating costs for covering incremental staff salaries, rent, office supplies, utilities, operating and maintenance expenditures of office equipment and vehicles, etc., would be disbursed on the basis of annual budgets to be prepared by implementing agencies and agreed with Bank.

53. **Procurement Planning.** The PMU shall prepare a Procurement Plan for the key contracts for goods, works and consultants' services expected under the Project. Whenever possible, procurement of works, goods and services would be packaged into large packages to attract good contractors. Procurement under the Project would be carried out in accordance with the procurement plan. Procurement plans would be closely monitored and updated on a quarterly basis, or as required. No procurement, regardless of the value, would be done by the implementing agency unless it has been approved under the procurement plan by the Bank. Any change in the estimated cost of any contract would promptly be conveyed to the Bank for its approval. No changes would be accepted after bidding documents have been made available to bidders.

54. **Prior Review.** Thresholds for prior review are given below. These thresholds would be reviewed in 18 months and adjustments upwards or downwards would be made based on implementation experience.

(i) All ICB contracts for works and goods;
(ii) All single source selection or direct contracts;
(iii) First NCB contract for works and goods irrespective of value;
(iv) First contract procured through shopping, for goods as well as works, and through community based contracting procedure;
(v) The first Consultants' Services contract with consulting firms, irrespective of value, and thereafter all contracts with firms estimated to cost US$200,000 equivalent or more;
(vi) First consulting services contract with individual consultants, irrespective of value, and thereafter all contracts with individuals estimated to cost US$50,000 equivalent or more.

55. **Post Review.** All other contracts would be subject to post review by the Bank. The PMU would send to the Bank a list of all contracts for post review on a quarterly basis. Post reviews as well as the implementation reviews would be done quarterly for the first 18 months or till the credit/loan disbursements reach US$100 million and thereafter bi-annually. Such review of contracts below threshold would constitute a sample of about 20 percent of the contracts.

56. **Frequency of Procurement Supervision.** Bank supervision would be carried out every six months, but more frequently in the early stages of the Project. In addition to the prior review, Bank supervision missions, including a procurement specialist, would carry out post review of procurement actions. The Bank's procurement specialist based in the Country Office in Pakistan would be available to discuss procurement issues with the PMU as and when needed.

57. **Detailed Procurement Arrangements.**

Main Works under component A, B, D

Ref No.	Contract Description	Estimated Cost (US$ M)	Method a/	Review by Bank	Expected Date of		
					Bid Opening	Evaluation	Award
MW1	Construction of main structure. River diversion, spillway, LLOs and related works	1480	ICB	Yes	Sep 15	Oct-15	Dec 15
MW2	Construction of waterways, power tunnels, powerhouse, penstock, and ancillary works	755	ICB	Yes	Sep 15	Oct-15	Dec 15
MW3	Supply & installation of turbines, generators and related equipment in the power house, transformers & short transmission line.	642	ICB	Yes	Mar 16	Apr-16	May 16
MW4	Construction of Transmission line from Dasu to Islamabad	300	ICB	Yes	Mar 17	Apri-17	May-17

Preparatory works under component C

PW1	Construction of 132 KV line from Dubair to Dasu	9	ICB	Yes	Sep 14	Oct-14	Dec 14
PW2	KKH1 relocation and access roads	63	ICB	Yes	Sep 14	Oct-14	Dec 14
PW3	Office buildings and colonies	43	ICB	Yes	Sep 14	Oct-14	Dec 14
PW4	KKH2 Relocation of remaining KKH and other bridges	150	ICB	Yes	Sep 15	Oct-15	Dec 15

Services

Ref No.	Contract Description	Estimated Cost (Million US$)	Selection Method	Review By Bank (Prior/ Post)	Expected Date		
					Prop. Submission	Evaluation	Award
S1	Construction Supervision DHP-I	60	QCBS	Yes			Apr-12
S2	Project Management Support Monitoring and Evaluation Services	8	QCBS	Yes	Feb 15	Mar-15	July 15
S2	Design and construction Supervision of the Dasu Transmission line	10	QCBS	Yes	Mar 14	May 14	July 14

58. **Social Resettlement Management Plan (SRMP) Costs.** The SRMP related costs under Component D3 and E1 of the Project to address the social issues would be based on the procedures agreed in the SRMP, following the country's law and guidelines. The costs cover land compensation, resettlement, livelihood restoration, public health interventions, local area development support and various other program investments, as well as monitoring, management, institutional strengthening, training and contingency cost. Transactions for more than US$50,000 equivalent would be subject to prior review and all other would be post reviewed. The prior review threshold level would be reviewed after one year and adjusted as appropriate.

Annex 4: Operational Risk Assessment Framework (ORAF)

PAKISTAN: DASU HYDROPOWER STAGE I PROJECT (P121507)

Project Stakeholder Risks						
Stakeholder Risk	**Rating**	**Substantial**				
Risk Description: Potential opposition from key stakeholder groups, such as NGOs who oppose the development of dams, hydropower projects, and from local communities in the project area.	**Risk Management:** Continued dialogue with relevant stakeholders, including Government agencies, donors, CSOs, private sector and local communities through communications, consultations, and frequent follow up.					
	Resp: Bank	**Status:** In Progress	**Stage:** Preparation	**Recurrent:** ☑	**Due Date:**	**Frequency:** CONTINUOUS
Implementing Agency (IA) Risks (including Fiduciary Risks)						
Capacity	**Rating**	**Substantial**				
Risk Description: WAPDA has a good track record working with the Bank, and good technical capacity, but the agency faces problems with revenue management and cash flow Financial Management: WAPDA has adequate capacity in financial management. Procurement: WAPDA has considerable experience in procurement and execution of large civil works contracts	**Risk Management:** Project implementation will be supported by a dedicated Project Management Unit that will receive technical assistance and adequate budget to implement the project. Procurement and FM will be supported by qualified staff and consultants, as well as through Supervision Consultancies and Monitoring and Evaluation Consultancies. Procurement documentation and record keeping systems, including a website showing the status of procurement of various contracts and their performance, would be established. A procurement complaint handling system would also be established to keep track of any complaints.					
	Resp: Client	**Status:** Not Yet Due	**Stage:** Implementation	**Recurrent:** ☑	**Due Date:**	**Frequency:** Continuous
Governance	**Rating**	**Substantial**				
Risk Description: Internal accountability in WAPDA remains weak, and there is little accountability or transparency in decision making within the agency. The size of contracts under the	**Risk Management:** To mitigate and guard against governance, corruption and fraud risks and to improve transparency and accountability in the implementation of Project activities, a comprehensive Governance and Accountability Action Plan (GAAP) will be prepared in					

proposed project provides some challenges for procurement oversight.	consultation with the Borrower and would be implemented by WAPDA					
	Resp:	**Status:**	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**
	Bank	Not Yet Due	Implementation	☑		Continuous
	A GAAP will be prepared together with WAPDA that will include, among other measures, the establishment of an independent Panel of Experts (IPOE) to review the prequalification process, and the bid evaluation report of the two major contracts under the Project and would also review the implementation of the contracts to ensure that the quality and the standards expected for such works are met.					

Project Risks

Design	**Rating**	**Substantial**			
Risk Description:	**Risk Management:**				
The project design draws on a feasibility analysis and detailed designs, as well as a strategic investment plan to develop hydropower in Pakistan. WAPDA is fully capable of executing designs with high levels of technical complexity, although the standards of construction will have to be carefully monitored.	The design of the project will be confirmed with international technical specialists to ensure the soundness of project design. The designs have been reviewed by the IPOE consisting international experts in the field of dams construction, hydraulics, geotechnical, environmental and social.				
Resp:	**Status:**	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**
Client	In Progress	Both	☑		Continuous

Social and Environmental	**Rating**	**High**			
Risk Description:	**Risk Management:**				
Key project social impacts are related to land acquisition and involuntary resettlement. Key environmental impacts relate to terrestrial ecology, aquatic ecology, and cumulative and induced impacts. Risks lie in the diligent implementation, faithful execution of the EMP and the adaptive approach embedded in the SRMP and maintaining sufficient quality staff in the field during the course of the project implementation. Respect for and sensitivity to local cultural and social norms is important to maintain good relations and a smooth operating environment for the project implementation. Misconduct and insensitivity could seriously disrupt the project	WAPDA will establish a project team in the field, with a leading group consisting of representatives from WAPDA, local administration and local Jirga. This will coordinate all project-related matters among the stakeholders, particularly with local communities. The project team will include a strong and fully-staffed social & environmental team to carry out EMP and SRMP implementation. The project team will be supported by a team of international and national experts under the Construction Supervision Contract, as well as qualified NGOs for the program implementation. A communication strategy and plan has been prepared and qualified experts will be recruited to raise awareness among staff and facilitate smooth communication with local communities.The project will also establish a regular mechanism to continuously disseminate project information and continue the engagement with all stakeholders.				
Resp:	**Status:**	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**

implementation.	Client	In Progress	Both	☑		Continuous
Program and Donor	**Rating**	**Moderate**				
Risk Description: The Bank is the lead development partner on this project, and no other donors are expected to contribute to the financing of the project. The Bank will mobilize IDA Guarantees, and coordination will be required to ensure the integration of all facets of the program.	**Risk Management:** The Government has committed to the development of Dasu as a high priority. The Bank is working closely with the Government to develop a sequencing plan for the medium and long term development of hydropower potential, as well as on a communications plan.					
	Resp:	**Status:**	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**
	Both	In Progress	Both	☑		Continuous
Delivery Monitoring and Sustainability	**Rating**	**Moderate**				
Risk Description: Monitoring the delivery of the project will face challenges due to difficulty in accessing the site at times. The sustainability of the investments are expected to be realized	**Risk Management:** WAPDA's monitoring and evaluation of the project will be conducted through the support of an independent monitoring and evaluation contract, to ensure the timely completion of quality works, and the appropriate implementation of the environment and social management plans for the area. The Client will be supported through close supervision on the part of the Bank, including travel to the area, and inspection of works, as well as follow up consultations with local stakeholders					
	Resp:	**Status:**	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**
	Client	In Progress	Both	☑		Continuous
Other (Optional)	**Rating**	**High**				
Risk Description: Given the suggested sequencing of the financing and its structure in several packages, the project bears the risk at every financing sequence that the financing could not be raised at the time the next financing is due.	**Risk Management:** The team is working closely with the Government of Pakistan and WAPDA to identify sources of financing and the mobilization of IDA Guarantees. Initial informal market soundings by the Bank team indicated that commercial lenders would be interested in considering providing financing for this project, though also indicated that substantial credit enhancement through an ECA or IDA Guarantees would be required to minimize the uncovered commercial and political risk. In case that despite those initial positive indications from the market less (than assumed in the Base Case) commercial funding could be raised for this Project, alternative mitigation measures are in place: Additional IDA credits could be made available in future IDA cycles, and IDA could also follow up with other development partners for co-financing. In addition, when Pakistan qualifies for IBRD funds, which is likely early in implementation of the project, any commercial					

	funding shortfall could also be further mitigated by IBRD funding.					
	Resp:	**Status:**	**Stage:**	**Recurrent:**	**Due Date:**	**Frequency:**
	Both	Not Yet Due	Both	☑		Continuous

Overall Risk		
Overall Implementation Risk:	**Rating**	**High**

Risk Description: The overall risk rating for the project is “High”. This is based on governance risks primarily due to the operating environment, large contracts involved, social and environmental aspects and the risk of shortfall in proposed commercial financing of works and export credits for equipment and machinery. The risks should be considered in the context of substantial benefits of providing 2,160 MW of low cost, low carbon renewable energy to the country, and the projected rewards are considered high as well.

Annex 5: Implementation Support Plan
Dasu Hydropower Stage-I Project (DHP-I)

Strategy and Approach for Implementation Support[18]

1. The strategy for implementation support (IS) has been developed based on the nature of the proposed Project. It aims to make the support to the client for implementation more flexible and efficient and focuses on the implementation of the risk mitigation measures as defined in the ORAF.

- **Procurement**: There are four very large ICB contracts, which include construction of the main structure (US$1480 million), power tunnels and power house (US$755 million), power plant (US$643 million), and construction of Dasu Transmission Line (US$300 million). The Bank Team has been providing and would continue to provide implementation support through: (a) technical, management and procurement expertise funded by the ongoing Water Capacity Building, and Tarbela IV Projects; (b) training to members of the procurement committee and related staff in the regional project offices, as well as the Construction Supervision Consultants; (b) reviewing procurement documents and providing timely feedback to the procurement committee; (c) providing detailed guidance on the Bank's procurement guidelines to the procurement committee; and (d) monitoring procurement progress against the detailed procurement plan developed by WAPDA as well as NTDC.

- **Financial management**: Supervision would review the Project's financial management system, including but not limited to accounting, reporting and internal controls. Supervision would also cover contracts on a random sample basis. The Bank Team would also work with the CSC to assist WAPDA and NTDC's PMUs in improving coordination among different departments and units for financial management and reporting.

- **Environmental and social safeguards**: The Bank Team would supervise and provide support to WAPDA for the implementation of the agreed EMP and SRMPP.

- **Governance and Accountability Action Plan (GAAP)**: The Bank Team would supervise and help in the implementation of the agreed procurement and GAAP.

- **Technical Aspects/Independent Panel of Experts**: The Bank Loan would support an Independent Panel of Experts (IPOE) consisting of internationally renowned experts in the fields of dams, hydraulic structures, rivers and structural engineering, geotechnical and foundations expertise, electrical and mechanical equipment, sediment management, procurement and contracts management, etc.

Implementation Support Plan

2. Some of the Bank Team members would be based in the Country office, some in Washington and others in country offices in the Region to ensure timely, efficient and effective implementation support to the client. Timely monitoring and support to WAPDA would be mainly provided by the team members in the country offices of the Region, especially for the first 18 months. Formal supervision and field trips would be carried out at least semi-annually or as often as needed for smooth implementation of the Project.

3. Detailed inputs from the Bank Team are outlined below:

- **Technical inputs**. Dam, hydraulic structure engineering and electro-mechanical equipment

[18] This is an indicative and flexible instrument which will be revised during implementation as part of the ISR and adjusted based on what is happening on the ground. The implementation plan should be consistent with the design and riskiness of the operation, and should be adequately resourced.

expertise is required to review bidding documents to ensure fair competition through proper technical specifications in the bidding documents and fair assessment of the technical aspects of the bids. The Bank Team would contract individual consultants for these skills. Specialist and high level procurement skills are required for review of the major works contracts as well as the two consulting services, CSC and PM&ECs. During construction and commissioning, technical supervision is required to ensure contractual obligations are met on technical grounds. Field visits by the team's dam, hydraulic and electro-mechanical engineers would be conducted on a semi-annual basis throughout Project implementation.

- **Fiduciary requirements and inputs**. Training would be provided by the Bank's financial management specialist and procurement specialist. The team would also help WAPDA and NTDC identify capacity building needs to strengthen its financial management capacity and to improve procurement management efficiency. Both financial management and procurement specialists would be based in the Country office to provide timely support. Formal supervision of financial management would be carried out semi-annually, while procurement supervision would be carried out on a timely basis as required by the client. WAPDA and NTDC would be provided with consulting services in this area and assistance by CSC and PM&ECs. In addition under Component G of the Project, funds are available to WAPDA for recruitment of specialized skills as needed. The Bank can help in identifying the consultants needed for these required skills.

- **Safeguards**. Inputs from an environmental and a social specialist are required for continuous and diligent implementation supervision and to provide high quality and time advisory support. Field visits are required on a regular basis at a higher frequency than the normal semi-annual frequency. Both international and national social and environmental specialists are required for supervision. The PM&ECs would help in independent monitoring of the safeguard aspects and flagging to the Bank Team any issues, as well as possible alternative solutions in a timely manner.

- **Operation**. An operations officer based in the Country office would provide day-to-day supervision of all operational aspects and coordination with the client and among Bank Team members. Also INT preventive services staff would join some of the supervision missions.

4. The main focus of implementation support is summarized below:

Time	**Focus**	**Resource Estimate**	**Staff Weeks**
First Year of the Project Or 18 months	Technical review, procurement review, site review, bidding documents	Dam, hydraulic structures (with Procurement exp.) Electro-mechanical Engineer (with Procurement expertise.) Procurement Specialist	4 3 6-7
	Procurement training, FM training	Procurement and FM Specialists	5
	SRMP implementation	Social Specialist/ RAP Specialist	20
	Environmental supervision	Environmental Specialist	10
	Institutional and capacity building of WAPDA, Financial and strategies issues, etc.	Institutional Specialist Financial Specialist	4 4
	Hydro-power generation system	Hydropower specialist	3
	Financing Specialist	Project Financing, commercial financing Guarantee specialist	10
	Task Team Leader	TTL	8
Year 2-5 of the Project SWs per	Project construction	Dam, hydraulic structures Engineer Electro-mechanical Engineer Procurement and Contract management	4 3 4

Time	Focus	Resource Estimate	Staff Weeks
year	Environmental and social monitoring	Environmental Specialist Social/RAP Specialist	10 20
	Financial Management, disbursement and reporting	FM Specialist, Disbursement Specialist	5
	Institutional arrangements, capacity building of WAPDA, financial strategy for WAPDA	Institutional Specialist	3
	Financing Specialist	Project Financing, commercial financing Guarantee specialist	10
	Task Team Leader	TTL	10

5. The staff skills mix required is summarized below

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Dam, Hydraulic structure Engineer	4 SWs annually	Fields trips as required.	International
Electro-mechanical Engineer	3 SWs annually	Field trips as required	International
Procurement Specialist	5/8 SWs annually	Fields trips as required.	Country office based
Procurement Specialist	4 SWs annually		International
Social Specialist (national)	10 SWs annually	Fields trips as required.	Country office based
Social Specialists (intern.)	10 SWS annually	Field trips as required	International/ Regional
Environmental Specialist	10 SWs annually	Fields trips as required.	Country office based
Environmental Specialist	8 SWs annually	Field trips as required	International
Financial Management Specialist	4 SWs annually	Fields trips as required.	Country office based
Financial Management Specialist	2 SWs Annually	Field Trips as required	International
Institutional Specialist	4 SWs annually	Field trips as required	International
Financing specialist, guarantee specialist etc.	8 Sws annually	Field trips as required	International
Task Team Leader	10 SWs annually	Fields trips as required	International/Country based

Annex 5.1: Governance and Accountability Action Plan (GAAP)
DASU Hydropower Stage I Project (DHP-I)

1. The Governance and Accountability Action Plan (GAAP) for the Dasu Hydropower Stage I Project (DHP-I) is designed to reflect the specific responsibilities of the implementing agency, the Water and Power Development Authority (WAPDA), NTDC and the World Bank to facilitate effective and appropriate use of the funds for the Project, preclude the incidence of corruption and enhance good governance. This plan is based on an assessment of the governance risks, particularly fraud and corruption, the context for addressing Governance and Anti-Corruption (GAC) issues in Pakistan and specifically for the entities involved with the DHP-I. It also is based on Bank experience in addressing governance and anti-corruption issues, and, in particular, the Bank's experience in having financed large infrastructure and similar hydropower plants. The GAAP would be adjusted as necessary during implementation to reflect governance issues which may emerge and/or to strengthen or add actions. It would be monitored regularly through indicators and reflected in monthly progress reports by the implementing agency, as well as in World Bank implementation supervision reports and aide memoires for supervision missions.

Country Context and Background Analysis

2. **Governance** is a considerable concern for growth and development in Pakistan. The worldwide governance indicators suggest that Pakistan is at or below the 25th percentile on key dimensions of governance. Institutions of accountability have not provided a strong framework for holding the executive or service delivery agents accountable for results. The 18th amendment bill which handed over control of key public sector services to the provinces is generally viewed positively but there is concern over implementation capacity in some provinces. There are several governance improvements in process in Punjab and KP like the new Right to Information legislation. Overall Pakistan is a high risk environment from a governance point of view.

3. **Systemic Corruption.** Perception of corruption has increased in recent years. Pakistan's Transparency International corruption ranking increased to 127 in 2012 from 139 (178 countries were surveyed).

4. The DHP-I is a high-profile project, which in itself has important implications for governance. Due to prolonged blackouts, the people of Pakistan, the majority of civil society, support the Project as it would provide additional energy at lower cost. They are keen to ensure that it is implemented properly and on time. It is the signature project of this Government, which is determined to reduce the load shedding and the Project is a source of cheaper electricity to achieve that. Moreover, the size of the works involved is large, which means they will be observed by major organizations and governments of contractors' countries of origin, other contractors internationally, professional and engineering societies and the international press. For this reason, strong latent demand for good governance exists. However, large contracts are also seen by the governments and power brokers as rent-seeking opportunities. Therefore, a strong GAAP has been agreed for the Project to ring-fence it from such possibilities.

5. The Project's prominence is also significant for potentially providing a model for good governance and sound institutional arrangements, thereby generating positive demand-side pressures on other institutions in the public sector. Several GAC measures and robust arrangements have been introduced in this Project to provide additional checks which are somewhat unique to this Project, and may be less transferrable in terms of institutional development to public sector performance as a whole. However, some good practices contributing to successful implementation, such as extensive disclosure or third party monitoring of procurement practices, will serve as a valuable example for other public sector bodies and development projects.

6. The Bank's strategy for improving governance in Pakistan, laid out in its Country Partnership Strategy, focuses on developing accountability mechanisms in public sector operations, especially

through increased transparency. The Bank seeks to align with Government priorities in developing the means of accountability, especially strengthening of public financial management, support for local government, use of information and communication technology and the adoption of a right to information regime. In particular, the Bank is working with the Government to improve budgeting practices among line agencies in conjunction with enhanced accountability mechanisms. It is working to increase the role and quality of oversight of public finances by the Parliamentary Accounts Committee, improve capacity of the Comptroller and Auditor General's Office, and promote greater public understanding of public financial management to build more informed demand and ability to hold Government accountable. The Bank's strategy also focuses on improving public service delivery, a key component of which is fostering greater accountability to recipients of services including through a strengthened role for local government. The Bank also continues to emphasize the importance of building demand for good governance among civil society, which in turn requires facilitation of avenues for civil society to engage with, and monitor the performance of, the public sector.

7. The Bank maintains a strong policy against corruption, and presses for sanctions on those who engage in it. Similarly, the Bank recognizes the importance of strengthening country systems to prevent corruption from occurring. Given the heightened integrity risks for this Project, the GAAP is based on ensuring that every action in the Project is identified in detail and subject to heightened multi-party scrutiny. Complementing this GAAP is the Bank's regular system of investigation and potential sanctions for fraud and corruption operated by its Integrity (INT) Vice Presidency (including cross-debarment provisions with other multilateral development banks).

8. The experience with other large infrastructure projects offers lessons for addressing GAC concerns which have been internalized in the DHP-I. These include: (i) designing a procurement plan that allows or extensive scrutiny and obtains the best construction expertise available; (ii) engaging in comprehensive prior consultations and designing an effective communications strategy during construction; and (iii) ensuring multiple, robust monitoring mechanisms. The Project monitoring would involve: (a) dedicated staff in the Project Management Unit (PMU) of WAPDA under General Manager Dasu for engineering as well of the NTDC for the transmission line; (b) WAPDA's internal control by various organization such as internal audit, office of Member (Water) Authority Team and in particular a Central Contract Cell; (c) construction supervision by internationally recruited Construction Supervision Consultants (CSCs) who would be the "engineer" for the civil works contracts; (d) consultant support for environment and social aspects and an independent M&E consultancy to monitor progress, performance of the contracts and execution of works and supervise the Environmental Management Plan (EMP) and SRMP activities; and (e) an independent panel of experts (IPOE) who would also have a highly qualified procurement and contract management specialist. It would also involve enhanced Bank supervision, including an in-country consultant who would visit the Project site on a regular basis in the first two years of the Project, when construction would be taking place, to keep the Bank and the WAPDA and the Ministry of Water and Power informed of issues arising in project implementation.

9. Institutional arrangements for implementation were determined through analysis of the relevant institutions and lessons learned from the past. WAPDA as an independent authority for hydropower development was *a priori* the appropriate institution given its mandate. WAPDA has demonstrated a good track record of on time and on-budget implementation of large infrastructure projects in Pakistan. It has been the implementing agency for the Bank-supported Indus Basin projects resulting from the Indus Treaty of 1960. This consisted of construction of unprecedented proportions to be carried out in the decade following the attribution of the eastern rivers to India, covering nine link canals connecting the western rivers with eastern rivers, five barrages and two dams (Mangla and Tarbela). For these reasons, WAPDA has been entrusted with implementation of the DHP-I in conjunction with robust monitoring measures.

10. WAPDA also underwent a review of its procurement and financial management systems. The assessment covered the legislative framework, procurement planning, procurement processing,

organizational functions and staffing, internal control and support system, record keeping, and contract administration. In addition, a review of financial management systems was conducted. Capacity building and strengthening of WAPDA is supported through the ongoing Water Capacity Building Project (WCAP) and Tarbela IV Project substantial resources are incorporated in the Project (Components G) to continue enhancing WAPDA's institutional capacity.

Governance and Corruption Risks

11. Three areas of GAC risk have been identified under the DHP-I: institutional and organizational weaknesses in the implementing agency; specific procurement risks; contract management and execution risks. Given that the sector is plagued with governance issues in electricity generation, distribution and revenue collection, extraordinary losses and theft of electricity and that WAPDA Hydel and the Project would be operating in this overall setting, a strong governance and accountability framework has been agreed to ring-fence this operation from the sectoral issues to ensure that funds are used appropriately for the Project without any external interferences.

12. **Institutional Risks.** WAPDA as well as NTDC has a track record of carrying out large projects. Currently, there are over 10 ongoing large hydropower projects in its portfolio. There have been some governance issues in the past. Therefore, stronger accountability for performance and internal controls to counter fraud and corruption is needed. Systems for provision of information to the public and handling complaints or feedback from third parties on performance are nascent.

13. **Procurement risks.** Possible risks include fraud, corruption, collusion, and coercion amongst parties involved in the procurement process. For example: collusion among the bidders; corruption involving bidders and government officials; fraudulent documents; corruption between the bidder and the engineer; and corruption between the winning bidder and the approving authority. Conflicts of interest may present a serious problem, most notably through relationships with government officials, whether direct or indirect, including through companies and/or relatives of officials.

14. **Contract execution and project management risks**. Corruption is also possible between the contractor and the PMU, including but not limited to aspects related to quality assurance, extension of time, variations to contract and price adjustment. For this the WAPDA's Central Contract Cell would be involved in the evaluation and award of the contract and would check contract implementation. Corruption can also involve the independent Construction Supervision Consultants (CSCs) retained to serve as engineer on the contracts and oversee technical implementation. Notwithstanding the substantial reputational risk for the internationally recruited consultants, the Bank Standard Bidding Documents modeled on the FIDIC documents also have provisions to deal with the possibility of such corruption.

Actions to Mitigate GAC Risks

15. GAC concerns would be addressed through a combination of Project design and special measures to reflect three basic principles: maximum transparency and provision of information about every step or action undertaken including the individuals or entities involved; ensuring that multiple parties are in place to provide external assessment of the actions that are undertaken in order to have a robust system of scrutiny and checks; and enhanced use of mechanisms for feedback from individuals outside the implementation of the Project, particularly through use of information and communication. Below is a summary of the actions to be undertaken and warning signs to trigger additional review through Bank supervision and/or investigation (also summarized in attached matrix). It is important to stress that these measures are not meant to be exhaustive. Depending upon emerging risks highlighted by more intense Project monitoring, additional measures may be necessary.

16. **Institutional risks.** WAPDA/NTDC and the Project are provided with more skilled and professional staff to deal with bidding documents and evaluations of large value contracts, and to

administer large and complex contracts. To strengthen financial management systems with enhanced internal controls, including a more robust internal audit capacity, additional staff have also been recruited.

17. The Project Management Units (PMU) has been strengthened with additional staff responsible for day-to-day implementation within the General Manager DASU Office (a detailed description of administrative and Project oversight arrangements is in Annex 3). Specifically, there would be dedicated staff in the PMUs for engineering construction supervision by internationally recruited CSCs who would be the "engineer" for the civil works contracts, consultant support for environmental and social aspects, and an independent M&E consultancy (internationally recruited) to monitor progress and supervise the Environmental Management Plan (EMP) and Social Resettlement Management Plan (SRMP) activities and contract performance and quality control. The IPOE would also have a procurement and contract management expert to oversee the procurement and contract management process.

18. Multiple oversight entities would scrutinize PMU performance, particularly on governance and countering corruption. The PM&ECs would carry out monitoring and evaluation of Project performance, including of financial management. Second, the Project would have an IPOE consisting of eminent Pakistani and international experts to review the designs for the Project and contract management. The IPOE primarily provides technical review but also would ensure additional scrutiny to guard against corruption. With individuals of professional competence and well-regarded reputations, it has unique technical capacity to recognize misconduct in performance of works that others might miss. In particular, the IPOE would review the pre-qualification evaluation report and bid evaluation report of the two major contracts i.e., for construction of the power house and other works and supply and installation of electro-mechanical equipment. The IPOE would also review key issues during implementation of contracts and major variation orders to the works contracts and undertake site visits every six months or as often as required to ensure that quality of construction is according to the expected standards.

19. The Project would provide extensive access to a broad range of civil society organizations (CSOs) and media regarding all aspects of Project performance as part of its communications strategy. This would entail regular accountability meetings with CSOs operating near the Project site and in Islamabad and Lahore as well as visits at WAPDA offices and the Project site to demonstrate Project progress and allow for questions. CSOs would be expressly informed that they are free to ask any questions and receive any information about the Project.

20. WAPDA's finance function is headed by a Managing Director (Finance) who is also a Member of the Authority. Day-to-day management of the finance function is carried out by the General Managers posted in different wings of the Authority, for example, GM Finance Water heads the FM function in the Water wing and GM Finance Power in the Power wing. The financial management of the Project would be under control of the GM Finance Power even though the Project would be executed by the Water wing headed by Member (Water). The deployment of finance staff for this Project would be coordinated by the GM Finance (Water) who would also ensure that high quality staff is appointed. The GM Finance (Power) would have overall responsibility to oversee the financial management of the Project. The GM Finance (Power) is assisted by four Directors and two Managers. The financial management team at WAPDA is professionally qualified and experienced. A qualified professional accountant with adequate experience in financial management of large infrastructure projects would work in the PMU as the Financial Management Specialist (FMS) with terms of reference agreed with the Bank.

21. **Internal Controls.** The Book of Financial Powers describes standard processes, minimum documentation and approval limits for processing different types of payments, which ensures segregation of duties. The existing internal systems of WAPDA would be used for financial management of the Project. However, the PMU would devise brief Standard Operating Procedures (SOPs) for financial management including contract payments in line with the World Bank's financial management policies and guidelines.

22. **Internal Audit.** The Internal Audit Division of WAPDA is headed by a Chief Auditor who reports directly to the Member (Finance). Recently, an Audit Committee comprising Member (Finance) as Chairman, Member (Power), Member (Water), Chief Auditor and Deputy Chief Auditor as Secretary has been constituted to review internal audit reports. The Project would support WAPDA's internal audit function by providing necessary equipment, software and hardware. WAPDA would prepare a plan for strengthening its Internal Audit Division to bring it in line with international standards. The Internal Audit Division of WAPDA would carry out an internal audit of the Project on an annual basis.

23. **Procurement Risks.** These risks are addressed through the overall design of the Project and through enhanced transparency, in addition to following Bank ICB guidelines with their requirements for firm timelines, transparency, and other mechanisms to guard against corruption. Works, goods, and services procured under the Project have been grouped into large contracts (construction of main structure, powerhouse and other civil works, installation of turbines, generators and other equipment) and PM&E consultants / CSC consultants that have already been recruited to be carried out at one site. This concentration of contracts allows for extensive scrutiny and special arrangements for each procurement and subsequent management of execution. In order to avoid undue influence on procurements, a detailed mapping of each step in the procurement process with a designation of a finite list of persons with access to specified documents and associated information would be put in place and shared with the World Bank and monitored/verified through Bank supervision. A Technical Evaluation Committee (TEC) for each of the contracts would have a mixed composition to provide for a system of checks and monitoring to guard against collusion.

24. Bidding documents including the Request for Proposal, instructions to bidders/consultants, and model contracts would include measures to mitigate misconduct. For instance, bidders would be required to: disclose in full any agents used by the bidders during the procurement process, along with the terms on which those agents were hired (both scope of work and remuneration); and certify any conflict of interest most notably relationships with government officials, whether direct or indirect (e.g., via direct relationships with the officials related to the subject tender, or via companies and/or relatives of officials). These documents would also define the scope of the Bank's audit rights.

25. Transparency of the procurement process would be enhanced through a package of measures. The designated communication officer would develop and implement a detailed plan of disclosure by the Project. This would include disclosure of all relevant documentation and plans related to the procurement process with the goal of providing access to information to the wider community beyond interested bidders and supporting design, management, and construction consultants. Part of this plan would include a website in Urdu and English dedicated to the DHP-I prominently identified on WAPDA's website with a dedicated page for summaries of procurement actions, the procurement plan and any updates, and all documentation related to the procurements (outside of the proposals themselves). These documents would be placed on the website within one week of their issuance to the public domain (including after a Bank no objection, in cases where this is required). This documentation would include:

- Pre-qualification documents for ICB contracts more than US$10 million;
- All Invitations to Bid;
- Bidding documents and drawings;
- Clarification of bids;
- Bid opening minutes;
- Information on contract award;
- Information about short-lists including a narrative statement regarding the reasons for inclusion or exclusion of the bidders in the shortlist.

26. WAPDA would implement a broader communications strategy that would include information about procurement. Procurement information would be summarized in a quarterly newsletter produced by

WAPDA and distributed widely to civil society organizations in the Project region. WAPDA would promote the availability of all procurement information except information protected by confidentiality requirements of the procurement process on its website and in its newsletters as part of a program of periodic updates on progress. This information would also note that WAPDA will make available to any member of the public promptly upon request hard copies of such documents related to the Project, subject to payment of a reasonable fee to cover the cost of printing and delivery.

27. An enhanced complaints receipt and response unit would be established in WAPDA to operate throughout the life of the DHP-I, including during the procurement stage. WAPDA's website and newsletters would state clearly how to file complaints. The PMU would maintain a log of complaints which would track the status of response or follow-up. Depending on the nature of the complaint, the unit would assign the review of complaints to internal auditors or third party auditors, or may transfer the investigation of complaints to other appropriate investigative bodies such as the police or the Anti-Corruption Commission. All complaints received shall be responded to within five days of receipt, with a copy to WAPDA and the World Bank. Recording and appropriate referral of all incoming complaints would be undertaken by WAPDA, with each case generating an automatic, standard format report including the full text of the original complaint to the Bank. In addition a monthly report tracking the status of complaints and measures taken would be provided to WAPDA. Reports summarizing complaint cases which have been resolved would be published on the website. At all times and in all documents the anonymity of the complainant would be maintained.

28. All allegations and complaints that may potentially involve fraud and corruption would be reported to INT. The DHP's website and newsletters would state clearly how to file complaints through the following text to be displayed prominently:

"The contact point for complaints related to the DHP is:

To:

Project Director DHP-I Project
Water and Power Development Authority
Tarbela
Tel: Fax: e-mail:

To: the World Bank Fraud and Corruption unit
Email: investigations_ hotline@worldbank.org
Website: http://www.worldbank.org/integrity
If you prefer to remain anonymous, you may wish to make use of a free email service (such as Hotmail or Yahoo) to create an email account using a pseudonym. This way, we could correspond with you as necessary, to seek clarification or additional information. This would be helpful for us in pursuing your allegation. You may also contact us through a Fraud and Corruption Hotline hired by INT for this purpose: (24 hours/day; translation services are available)
Toll-free: 1-800-83 1-0463
Collect Calls: 704-556-7046
Mail:
PMB 3767, 13950 Ballantyne Corporate Place
Charlotte, NC 28277, United States"

29. **Contract execution and project management risks.** The transparency and enhanced complaints mechanisms put in place for procurement would also apply post-procurement during contract execution. The website would contain monthly updated information about Project activities including, *inter alia*, the current estimate of the progress of implementation (e.g., gross estimate of completion as a percentage of works to be carried out, other Project related activities such as workshops, and data concerning complaints and remedial actions. In addition regular accountability meetings organized by the PMU

would be held quarterly with CSOs in the region and in the capital to share information. These meetings would be attended by PMU, CSCs, as well as third party entities involved in monitoring execution.

30. **Numerous separate entities would be involved with execution of contracts** and therefore would also provide a check against misrepresentation. In the execution of the civil works contracts, the Project Director would serve as the *Employer's representative*, while the CSCs would serve as the *Engineer* for construction supervision. At the site, *Resident Engineers*, appointed by the CSCs, with a team of specialists and inspectors, would supervise the contractor. The M&E Consultants would provide independent monitoring of Project activities and implementation.

31. Third-party monitoring of the technical aspects involved with the civil works would be carried out by the IPOE. IPOE would provide a report to WAPDA and the Bank on a quarterly basis on its assessment of progress of the Project, quality of works and other construction and design issues. Technical audits can be initiated when found necessary to through appropriate mechanisms.

32. The contracts would have robust audit clauses that permit access to company documents related to both the procurement and contract implementation, and to any documents generated by the company during those processes (not just financial records). The latest Guidelines for audit clause language, which extend to companies that bid for contracts but did not win them, would also apply to procurements under this Project.

33. **Transparent implementation of Social Action Plan.** The SRMP is designed to be implemented in transparent manner with grievance redressal mechanisms. The PM&E consultants would monitor and carry out post review of the payments made to the beneficiaries under the SRMP.

Remedies and Sanctions

34. WAPDA/NTDC independently, or at the direction of the Pakistani oversight entities, would undertake disciplinary action up to dismissal of staff deemed to have violated financial management or other procedures. If it is determined that there is credible evidence to launch an inquiry into possible criminal actions (including for corruption), such cases would be referred for investigation to the Anti-Corruption Commission or police. All allegations and complaints that may potentially involve fraud and corruption would be reported to INT.

35. The Bank would apply sanctions and remedies as per its guidelines if it determines incidences of fraud, corruption, collusion, and coercive or obstructive practices. Information on the Bank's sanction process can be found at the website www.worldbank.org/sanctions. In addition, the Bank would coordinate with relevant entities in the event of misconduct issues.

36. Bank sanctions may include fines, blacklisting, suspension of disbursements, or ultimately cancellation with respect to that contract. The Bank would seek first to remedy cases of corruption through cooperation with the implementing agency and its oversight entities. Any entity that is found to have misused funds may be excluded from subsequent funding. Information regarding such cases, where lessons are learned and funds are retrieved, would be widely disseminated.

GAAP Monitoring Arrangements

37. The PMUs with support from the PM&ECs would be responsible for monitoring and reporting on the GAAP on a quarterly basis. Monitoring shall include both quantitative measures of implementation of actions, e.g., numbers of complaints received, followed up and resolved, numbers of persons at accountability meetings, recording of benchmarks, e.g., training of designated communication staff, and establishment of third party monitoring, as well as qualitative reporting on the efficacy of measures and instances where problems were corrected through these mechanisms. Its reports shall be submitted to WAPDA/NTDC and the Bank simultaneously. Upon clearance by WAPDA/NTDC, summaries of the

reports indicating complaints, investigations, and their outcome, without specific personalized information regarding shortcomings resolved internally, would also be disclosed to the Bank and the public through placement on the Project website.

Bank Supervision and Surveillance

38. Supervision arrangements for this Project, particularly for procurement and financial management, are extensive. Prior review thresholds would apply to almost all contracts in this case as the contacts are large. The first contract in all categories (goods, consultancy, works, etc.) would be subject to prior review regardless of its value in order to start good practice procurement and contract management. Post procurement reviews would be carried out by qualified Bank staff in procurement and contract management, and would be done quarterly for the first 18 months. Bank supervision missions would be more frequent at the start of the Project and would involve qualified staff in all disciplines, including procurement, contract management, and financial management. The Bank would also conduct regular monitoring between supervision missions, including an in-country consultant who would visit the Project site on a regular basis in the first two years of the Project, when construction would be taking place, to keep the Bank and WAPDA/NTDC informed of issues arising in Project implementation. The Bank would conduct a mid-term review of the Project after two years. Detailed plans for supervision by the Bank are given in Annex 5.

39. In addition, the PMU, the CSCs and the M&ECs would carry out extensive oversight of the implementation of contracts. An independent team of PM&ECs consultants would review overall progress in implementation and report on contract implementation issues to WAPDA and the Bank.

40. In terms of monitoring progress on the GAAP, the Bank would conduct six-month reviews during the Project implementation period. The reviews would assess progress, gauge the efficacy of measures, agree among all parties on areas for improvement, and make adjustments as appropriate. The Bank would update its assessment of GAC risks on an ongoing basis, and anticipates that adjustments to the GAAP would be likely to reflect what would be most effective in the context of the Project.

Matrix of Action
Dasu Hydropower Stage I Project Governance and Accountability Action Plan

Issues/Risks/ Objectives	Actions	Agency Responsible	Timeline	Early Warning Indictors to Trigger Additional Action
Need to strengthen capacity to handle large volume procurement, financial management, contract management communications, and monitoring functions.	Establish PMU within the General Manager GMs Office with competent staff and consultants Establish PMU in NTDC with competent staff and consultants	WAPDA NTDC	Most of the PMU staff has already been on board. Any remaining staff would be recruited by March 2014.	Delays in procurement, execution of two major contracts for construction of power house and other works and installation of machines etc, Delays in negotiating contract with CSC Delays in appointment of PM&E consultants.
	Retain construction supervision consultants for support and overseeing the procurement of major contracts and execution as the "Engineer".	WAPDA and NTDC	The consultants for CSC for WAPDA have already been selected and draft proposal for CSC was submitted as part of the contract for designs. The contract would be finalized after the Project is approved. NTDC consultants are being selected.	
	Contract PM&E consultants for monitoring and supervision of SRMP and EMP.	WAPDA	December 2014	
	Increase frequency of Bank supervision mission to review, including more supervision early in the Project.	Task Team/Bank	Regular Basis	
Need to improve internal accountability mechanism in WAPDA	Establish a Committee that reports to WAPDA and Member (Water) about Project implementation issues and also with membership from civil society organization (CSOs)	WAPDA	Established and ongoing	Changes in Committee, irregular meetings
	Strengthen internal audit system of WAPDA and expand to oversee the Project.	WAPDA	Ongoing during the Project	
Need for proactive provision of information and enhanced transparency	Designate information and communication officer and provide budget and support.	WAPDA/NTDC	June 2014	Lack of information or frequent replacements
	Maintain a website of implementation and procurement issues.	PMU/WAPDA/ NTDC	Regular as new information and procurement documents become available or at least once a month	
	Produce quarterly implementation reports identifying any implementation or procurement management issues.	PMU/WAPDA/ NTDC	Quarterly	
	Hold accountability meeting in the Project area with CSOs, media and other stakeholders.	PMU/WAPDA/ NTDC	Biannually	
	Implement the communication strategy.	PMU/WAPDA	Regular basis	
Procurement				
Reduce Risk of Procurement	Retain smart design of contracts processed in one location to enhance scrutiny.	PMU/WAPDA, NTDC Bank		Procurement red flags in prior and

Issues/Risks/ Objectives	Actions	Agency Responsible	Timeline	Early Warning Indictors to Trigger Additional Action
	Ensure that multiple parties, CSCs, Central Contract Cell of WAPDA and IPOE are legitimately involved in the process.	PMU/CSC/WAPDA/NTDC	Ongoing	post reviews.
	Enforce ICB procurement guidelines for documentation, timelines and transparency.	PMU/CSC/WAPDA and Bank	Ongoing	
	Carry out prequalification of the contractors based on stringent criteria that would meet the international quality standards for such works.	PMU/CSC/WAPDA/NTDC and Bank	Ongoing	
	Establish and maintain website and newsletter.	PMU/WAPDA/ NTDC	Ongoing	
	Enhance the complaints recording and reporting mechanisms and follow up according to the guidelines.	PMU/WAPDA/ NTDCCSC	Ongoing	
	Addition of clause in bidding documents that the bidders, suppliers and contractors shall permit, and shall cause their subcontractors, agents, personnel, consultants, and service providers to permit, the Bank to inspect the site and/or all accounts and records and other documents relating to submission of bids and contract performance (whether in electronic or hard copy format), and to have them audited by auditors appointed by either of them, following their respective policies and procedures.	PMU/WAPDA/ NTDC/CSC/ Bank	At the time of issuing or clearing bidding documents	
	Addition of clause in bidding documents in the context of Instruction to Bid (ITB) clause 3 concerning fraud and corruption, that the bidders would certify that: (i) to the best of their knowledge and belief, they, and any person or entity acting for them or on their behalf, have not engaged in any of the conduct defined in that clause; (ii) they will not indulge in such practices in competing for or in executing the contract; and (iii) any agent acting for them is aware of the ITB clause 3 and has committed in writing to comply with its requirements and to not engage in the conduct defined therein.	PMU/WAPDA/ NTDC/CSC/ Bank	At the time of issuing /clearing bidding documents	
Potential for or reduce risk of conflict of interest among participants in procurement	Declaration of no conflict of interest by WAPDA/NTDC personnel and members of the technical evaluation committee and bidders.	WAPDA/NTDC	WAPDA/NTDC by Effectiveness, bidders on submission	
	Require bidders' statements concerning agents and other possible connections to persons involved with procurement.	WAPDA/NTDC, Bank	At bidding stage	

Issues/Risks/ Objectives	Actions	Agency Responsible	Timeline	Early Warning Indictors to Trigger Additional Action
Contract Execution and Management Risks				
Potential for collusion of parties involved	Involve independent CSC, Central Contract Cell, WAPDA, NTDC authority and IPOE with the transactions, approving works and payments etc.	CSC/Central Contract Cell of WAPDA /IPOE/WAPDA NTDC	Ongoing at the procurement contract evaluation, award and implementation stage	Monitoring Reports identifying anomalies.
	Ensure third party monitoring by PM&ECs and IPOE.	PMU/IPOE/WAPDA NTDC	Ongoing upon appointment of IPOE and PM&ECs	
Need for greater capacity in PMU to exercise oversight	Adequate staffing of PMU with procurement, contract management staff as well as technical staff in works, dams, electro-mechanical equipment etc.	PMU/WAPDA	Ongoing	
	Ensure third party monitoring reports.	PMU/WAPDAP/NTDC/ M&E Consultants, IPOE	Ongoing	
	Information dissemination measures such as website, newsletter, communication with CSOs, etc.	PMU/WAPDA/NTDC/P M&E Consultants.	Launched within 3 months of Effectiveness	
Transparent Implementation of Social Action Plan				
Potential for improper targeting or false delivery	The SRMP to address the resettlement cases according to the process and procedure agreed in SRMP with grievance rederssal mechanism and with monitoring by PM&ECs.	PMU/WAPDA/NTDC M&ECs.	PMEC consultants would monitor the implementation of the SRMP	Monitoring Reports and other field reports identifying any anomalies.

Annex 6A: Project Economic and Financial Analysis
DASU HYDROPOWER STAGE I PROJECT (DHP-I)

1. This section presents an economic evaluation of the Dasu Hydropower Stage I Project (DHP-I) and of Dasu Hydropower Project (DHP) when fully built (Stage I and II) considering its cost effectiveness vis-à-vis the relevant alternatives and comparing the discounted costs and benefits to arrive at the Net Present Value (NPV) and Economic Rate of Return (ERR). The economic evaluation also presents a sensitivity analysis, and a best and worst case scenario analysis[19].

2. Pakistan is critically short of power. Its continued economic development is under threat unless the present shortages can be eliminated, increasing dependence on oil-fired electricity reversed, and the country provided with affordable electricity at times of the day and the seasons when it is required. Developing Pakistan's remaining hydropower resource is one of the few available opportunities for expanding power supply at relatively low cost, and the proposed Dasu project is an important component of this strategy.

3. DHP is part of the optimal development strategy for developing the water resource of the Indus River Basin. As a run-of-river project its reservoir size is relatively small, and its environmental and social impacts are modest, and mitigated by a proposed action plan that goes beyond mere minimum safeguards requirements of the International Financial Institutions: from the very beginning, stakeholder concerns have been integrated into the project design.

A. Project Implementation Plan

4. The DHP is proposed to be developed in two stages – each stage is further divided into two phases of 1,080 MW each, served by a separate tunnel. Phase 1 is expected to come online in about 5 years. The details of the phased development of the DHP are provided in the Annex 2 of the PAD along with cost and financing plan. The DHP Stage-I with installed capacity of 2,160 MW (six machines of 360 MW each) would be developed now and the Stage-II would be developed in future, for a total capacity of 4,320 MW, when other parts of the Indus Cascade are near completion. The economic and financial analysis is based on this implementation plan.

5. For transmission of power, a 500 kV double circuit line would have to be erected from Dasu to Islamabad (via Mansehra) that can serve two phases or Stage I i.e. an installed capacity of 2,160 MW. Another transmission line would be needed for Stage II. As per requirement, transmission line has to be completed six months prior to the commissioning of the generating plant/unit. The DHP would be implemented by WAPDA and the Transmission lines would be implemented by National Transmission and Despatch Company (NTDC).

6. The cost of Phase I is estimated around US$3,650 million, including physical and price contingencies and overall tax content of about 19%. The Phase I cost covers most of the infrastructure needed for power generation, including the river diversion, main structure, waterways to the powerhouse, generating equipment, electrical and mechanical equipment, social, and environmental management plan costs, transmission line and supervision and management of the project. The estimated cost of the Phase-II to install another 1,080 MW capacity is about US$600 million which brings the total for Stage I to US$4,250 million for the total installed capacity of 2,160 MW and generation of more than 12,000 GWh. The price contingencies for Phase II are higher (about US$80 million) as this expenditure is expected in the outer year of the project. The cost break-up is provided in Annex 2A Tables 2.2, 2.3 and 2.4.

7. As discussed below, the cost of electricity generated from DHP-I is significantly below that of thermal alternatives, and the economic and financial returns are robust with respect to all of the major risk factors.

[19] This economic analysis rests largely on two background reports (1) Dasu hydropower project justification and economic analysis prepared by consultant Peter Meier, March 2013 and (2) Detailed Engineering Design Report prepared by Dasu Hydro Consultants (a joint venture of Nippon Koei, Japan, and Dolsar Engineering, Turkey in association with DMC, NDC and PES, Pakistan), Part D, Volume 2, June 2013.

B. Project Justification

8. Pakistan has a nominal installed electricity generation capacity of nearly 23,500 MW. Actual available capacity, however, is much less due to the old age of facilities, variation of hydro (high in summers and low in winters) and forced outages caused by lack of fuel and inadequate maintenance.[20] At the same time pervasive shortages have led to widespread load shedding: the current shortfall during peak summer hours is around 6,000 MW, which is about one-fourth of the installed capacity and one-third of peak demand of 18,000 MW resulting in 6-8 hours of load-shedding.

9. This shortage situation, together with the lack of investment in the capital intensive hydropower sector – has led to an increasing share of thermal power plants. Consequently, despite huge hydropower potential in Pakistan, especially in the Indus basin, hydropower share has declined from over 70% three decades ago to around 29% presently (Table 6.1). Although the private sector is undertaking a number of smaller hydro projects, it has limited appetite for the long lead time and high capital cost of larger hydro projects that could make a significant inroad into eliminating shortages. Consequently, Government must take the lead in developing these larger projects, at least in the first stages of dam construction and environmental mitigation.

Table 6.1: Pakistan Generation Mix (% shares)

	1979/80	1989/1990	1999/2000	2008/09	2009/10	2010/11	2011/12
Hydro	72	44.9	29.3	33.8	32.3	35.3	29.0
Oil	28	20.6	39.7	34.6	38.2	34.3	36.2
Gas		33.6	29.8	28.6	24.7	25.4	29.4
Nuclear	-	-	-	1.3	2.4	3.2	4.9
Other	-	0.9	1.2	1.7	2.4	1.5	0.5
Total	100	100	100	100	100	100	100
Generation, GWh	13	38	66	95	100	101	99

Source: Pakistan Energy Yearbooks and NEPRA State of Industry Report (Various Years)

10. The first step in this comprehensive development of the remaining hydro potential of the Indus river basin was taken in early 2012, with the start of the Tarbela Fourth Extension Project (T4HP), financed by the World Bank. Several other sites have been identified and are at various stages of development, notably Diamer-Basha, Bunji, Pattan, Thakot and Dasu, all upstream of Tarbela. All of these projects are in the least cost Power Development plan, with expected levelised generation costs of less than US¢ 5/kWh, half that for thermal projects based on imported natural gas.

11. The Dasu project is an important component of Pakistan's power sector development strategy. Power shortages are crippling Pakistan's economic development prospects, so the Government has no choice but to take strong action to increase power supply. The consequences of a "no project" counterfactual are unacceptable, since increased reliance on oil-based self-generation in face of grid supply shortages further worsens oil dependence (as well as having highly damaging environmental effects that are much more difficult (and costly) to mitigate than those that arise at hydro projects).

12. Among the available options (discussed further in Section C), hydropower is the preferred choice. It has the lowest cost and as a domestic resource improves energy security. The foreign exchange impact is positive: the savings in gas imports over the 30-50 year lifetime of DHP-I far outweigh the higher imports of power generation equipment during project construction. It reduces GHG emissions compared to all fossil alternatives except nuclear. The environmental and social impacts are readily mitigated (and avoid the health damage costs of fossil alternatives). The only disadvantage is that its capital intensity

[20] The installed capacity of the Pakistan on July 1, 2012 was 23,538 MW, whereas the available capacity was 21,000 MW (winters is lower because of lower or non-availability of hydro power). Generation capability because of lack of fuel is even less; only 14,000 MW in the NTDC system during peak hours. (NEPRA *State of Industry Report 2012*).

and long lead time make hydropower the most difficult to finance. But the proposed phased development of DHP maximizes the chances of mobilizing the necessary financial resources.

13. The one proviso in this justification is that indeed the social and environmental impacts of DHP-I are satisfactorily mitigated as proposed. In fact, as shown below, the costs of mitigating the impacts on the project-affected households are modest, and indeed the proposed SRMP for Dasu proposes to improve, rather than merely mitigate, the lives of those who would be affected by the project and its reservoir. The Plan is for DHP-I to set a new standard for social and environmental mitigation, which will set the stage for development of Pakistan's other hydro projects.

Load Forecast and Demand for Electricity generated from DHP

14. Most forecasts expect the current shortages to extend for some time into the future. The long-term plan issued by NTDC makes the assumption that adequate capacity will be built to eliminate shortages within the next five years, a plan that includes commissioning of DHP in 2017-2018. Power Policy 2013 also envisages reduction in load-shedding in 5 years and has emphasized the importance of Indus Cascade including DHP. Under the phased development plan first units of Phase 1 and 2 will be commissioned in 2020 and 2021. Phase 1 has a very high load factor (85%) for a hydro project, and will in effect be equivalent to a base load project; only as the remaining phases are built will DHP function as a peaking project (with a load factor of 57% once all 12 x 360 units are installed by the mid-2020s).

15. Pakistan's peak demand is presently some 25,000 MW (including self-generation). The growth potential of the Pakistan economy is such that a 7-8% annual increase in potential peak demand is not unlikely. Even at a modest 5% annual growth rate, by 2020 the annual increase will be 2,000 MW, and by 2030, the annual increase in demand is 3,000 MW. Therefore, the commissioning of DHP-I would account for just 50% of the per annum increase in demand. Even an acceleration of the subsequent phases clearly poses no problem for power absorption particularly when coupled with the fact that Dasu hydropower is significantly cheaper than thermal generation.

16. **Dasu in the least cost expansion plan.** A least-cost capacity optimization plan was included in the National Power System Expansion Plan 2011-2030 (NPSEP), prepared for the National Transmission and Dispatch Company (NTDC) by SNC-Lavelin. The generation planning study confirms the presence of Dasu in the least cost expansion plan. In the NPSEP, Dasu is implemented in a single development with a 7 year construction period and enters service in 2017-2018. The assumptions for the thermal candidate options and the fuel cost assumptions used in the NPSEP are shown in Table 6.2 and Table 6.3[21] Based on these assumptions, Table 6.4 shows the resulting screening curve analysis, indicating the generation cost in $ per MWh: the bold numbers indicate the least cost option for the given load factor. Gas-fired CCGT is the least cost option except at very high load factors at which nuclear is least cost.

17. The screening curve analysis demonstrates the large cost advantage of the large hydro projects – which is independent of the thermal project load factors. DHP has generation costs (using NPSEP assumptions) of $39/MWh, less than half of the best thermal option, and regardless of load factor. Moreover, this cost comparison does not include the environmental externalities of thermal generation. The cost advantages of Dasu with respect to thermal options are so great that there can be little doubt that:

- the entry of Dasu into the expansion plan at its earliest possible in-service date is clearly least cost for the sector development as a whole.
- the need for DHP is robust with respect to the demand forecast: clearly it is the most expensive thermal plants that should be delayed under lower than expected demand growth. Moreover, even if load growth were zero, the reserve margin is so low that additional capacity is required just to alleviate the present level of shortages, and Dasu would be the least cost option for doing so.

[21] The capital costs of coal appear to be on the high side, especially for the Asia-Pacific market where costs of around 1,250-1,500 $/kW are more typical. However, even at significantly lower capital costs for coal, the cost advantage of hydro projects in general, and DHP-I in particular, remain.

- For the purpose of the economic analysis, use of CCGT as the next best thermal alternative is reasonable (and likely to be conservative)

Table 6.2: Assumptions for candidate thermal projects

Unit Type	Fuel Type	Capacity		Capital Cost		Fixed O&M	Var. O&M	Site Effic.	Heat Rate	Forced outage
		ISO MW	Site MW	ISO $/kW	Site $/kW	$/kW/y	$/MWh	[ ]	Btu/kWh	[ ]
GT-60	Gas	70	60	588	588	24	1.7	0.342	9,985	0.068
GT-155	Gas	182	155	494	494	19	1.5	0.374	9,120	0.068
CC-215	Gas	239	215	990	1100	31	2.3	0.556	6,140	0.046
CC-456	Gas	507	456	820	911	28	2.0	0.53	6,435	0.046
CC-707	Gas	786	707	780	867	27	1.8	0.571	5,980	0.046
ST-200-Oil	Oil	200	200	1,520	1,520	25	2.8	0.362	9,420	0.07
ST-600-Thar	Thar coal	600	600	2,050	2,050	35	3.6	0.369	9,250	0.095
ST-600-Imp	Imp coal	500	600	1,850	1,850	30	3.0	0.375	9,100	0.09
Nuclear-500		500	500	5,175	5,175	32	3.0	0.335	10,200	0.11
Nuclear-1000		1,000	1,000	4,600	4,600	28	2.7	0.352	9,690	0.11

Source: NPSEP, *op.cit.* Table 13.

Table 6.3: Fuel cost assumptions

	$/mmBTU
Crude oil (US$ 96/bbl approx)	16.4
Imported Natural Gas	10.6
Imported LNG	13.2
Furnace Oil (high sulfur)	12.6
Furnace Oil (low sulfur)	13.8
Diesel	21.7
imported coal	6.2
Thar coal (mined)	4.0
Thar syngas (UCG)	2.9
nuclear fuel (U3 O8)	0.4

Source: NPSEP, *op.cit.*

Table 6.4: Screening curve analysis, $/MWh

	Annual load factor								
Type	10%	20%	30%	40%	50%	60%	70%	80%	90%
GT-60	222	169	152	143	138	134	132	130	129
GT-155	194	150	136	129	124	121	119	118	116
CC-215	254	164	133	118	109	103	99	96	93
CC-456	228	152	127	114	107	102	98	95	93
CC-707	**216**	**143**	**119**	**107**	**100**	**95**	**92**	**89**	87
ST-200-Oil	381	270	233	214	203	196	191	187	184
ST-600-Thar	383	226	173	147	131	121	113	108	103
ST-600-Imp	355	215	168	144	130	121	114	109	105
Nuclear-500	772	389	261	197	159	134	115	102	91
Nuclear-1000	686	346	232	176	142	119	103	91	**81**

Source: NPSEP, *op.cit.*, Figure 6

Hydropower and Pakistan's Energy Security

18. Pakistan's fundamental energy problem is that its resources of oil and gas are limited. As noted by the Planning Commission, Pakistan's natural gas reserves have depleted to such an extent that even with reasonable expectation for new discoveries it will be difficult to maintain even the present level of

production for long.[22] In the DPC reform program several actions are proposed to increase the gas supply, which will also help in reducing the cost of power generation and shortages. Presently, the oil resources are small, and already some 89% of the oil requirements (equivalent to 28% of the total energy supply) are being met through imports, with the oil imports bill siphoning off one-third to half of export earnings (36% in 2006-07, 57% in 2007-08 and 62% in 2011-12). Yet, as noted in Table 6.1, oil and gas have accounted for an *increasing* share of electricity generation, largely for failure to develop the other alternatives in a timely manner. Pakistan therefore needs to exploit such potential domestic resources as it does command if its energy security is not to be compromised further.

Hydropower as a component of low-carbon power sector development

19. Pakistan's total GHG emissions in 2008 amounted to 309 million tons (mt) of carbon dioxide (CO_2) equivalent: the biggest contributor is the energy sector with 50% share, followed by the agriculture sector (39% share), industrial processes (6% share) and other activities (5% share).

20. Presently, Pakistan is a small GHG emitter: On per capita basis, Pakistan with 1.9 tons per capita GHG emissions stands at a level which corresponds to about one-third of the world average, one-fifth of the average for Western Europe and one tenth of the per capita emissions in the U.S., putting it at 135th place in the world ranking of countries on the basis of their per capita GHG emissions (from highest to lowest).

21. However, like other developing countries, Pakistan's emissions are bound to increase considerably as the country climbs over the development ladder and strives to provide adequate amount of energy to support its growing socio-economic developmental needs. Moreover, as noted by the Planning Commission, as a responsible member of the international community, Pakistan would like to contribute to the global GHG mitigation efforts without compromising on its basic minimum energy and food needs consistent with its socio-economic developmental requirements, energy security considerations, and financial and technological constraints. Indeed, Pakistan is much more vulnerable to the impacts of global climate change than developed countries, and has already experienced the deleterious impacts of such climate change as has already occurred.

22. Developing hydropower resources is the perfect way for Pakistan to contribute to global GHG emission reductions, because not only can hydropower be produced at less than half the cost of thermal generation, but it thereby also significantly reduces GHG emissions without compromising other development objectives. It is a classic example of a "win-win" option.

23. Large hydro reservoirs may also be sources of greenhouse gasses, associated with CO_2 and methane releases from reservoirs that may inundate significant standing biomass. However, in the particular case of DHP (and run-of-river projects generally), the reservoir will inundate very little biomass, and the inundated surface area per MW of capacity is extremely small by international standards and retention time for the water is extremely small.

C. Project Alternatives

24. The economic analysis shows that DHP-I has net benefits greater than those of mutually exclusive project alternatives. In Pakistan there exist a series of options such as Demand Side Management (DSM) and improved utilization efficiency, and reduced T&D losses, that are likely to have high economic returns comparable to DHP-I (and other hydro projects). However, these are complements to, rather than mutually exclusive substitutes for, DHP-I and will be implemented regardless of whether DHP-I is built or not.

25. The relevant alternatives to the proposed DHP-I design fall into four categories: (i) no project option, (ii) hydro projects other than Dasu, (iii) non-hydro generation options (coal, oil, gas and renewables) and (iv) given a project at Dasu, alternative designs (sites, sizes and turbine-generator configurations).

[22] Planning Commission of the Government of Pakistan, *Task Force on Climate Change*, Final Report, February 2010

26. **The "no-project" alternative** can be dismissed as being unrealistic, because Pakistan will in fact build additional generating plants to eliminate power shortages. Indeed, given the prohibitive costs of fuel oil-based electricity generation, development of Pakistan's hydro resources represents the only reasonable prospect of eliminating these shortages. Indeed, until such time as power shortages are completely eliminated the incremental output of DHP-I would serve primarily to reduce these shortages – the benefits of which are largely the same as that of the "no project" counterfactual: i.e., substituting grid electricity for diesel self-generation and kerosene for lighting.

27. **Alternative Hydro Projects.** The Project is least cost when compared to the various ongoing and planned hydro schemes in the country – (i) public and private, (ii) run-of-river and storage, (iii) up- and down-stream of DHP, and (iv) on rivers other than the Indus (Jhelum & Swat) (Table 6.5). These projects are mostly on Indus River where river flows and elevations are available and some are on Jhelum River. Both of these rivers are with Pakistan according to the Indus Treaty of 1960 and their catchment is also located in the country. One project is on the Swat River which has relatively smaller inflow.

Table 6.5: Estimated cost of various Hydropower Projects

Sr. No	Name	Owner	Capacity	Generation	Unit Costs		River
			MW	Gwhs	USD/kW	US¢/Kwh	System
	Projects Under Various Stages of Constuction or Recently Completed						
1	Allai Khawar	WAPDA	121	463	1,345	3.73	Indus
2	Khan Khawar	WAPDA	72	306	1,356	3.39	Indus
3	Duber Khawar	WAPDA	130	595	1,477	3.42	Indus
4	Jinnah Hydropower	WAPDA	96	688	2,150	3.18	Indus
5	Neelam Jhelum	WAPDA	969	5,150	2,229	4.45	Jhelum
6	Patrind	IPP	147	633	2,463	8.29	Jhelum
7	New Bong	IPP	84	470	2,560	8.55	Jhelum
8	Tarbela 4th Extension	WAPDA	1,410	3,871	645	2.49	Indus
	Planned Projects						
9	Dasu Hydropower Stage I	WAPDA	2,160	12,225	1,968	3.69	Indus
10	Dasu Hydropower Stage I & II	WAPDA	4,320	21,485	1,389	2.96	Indus
11	Thakot	WAPDA	2,800	14,095	2,500	5.27	Indus
12	Pattan	WAPDA	2,800	15,230	2,500	4.88	Indus
13	Diamer Bhasha	WAPDA	4,500	18,097	2,510	6.62	Indus
14	Bunji Hydropower	WAPDA	7,100	24,088	1,710	5.35	Indus
15	Lower Plas valley	PPP	665	2,658	1,786	4.74	Indus
16	Lower Spat Gha	PPP	496	2,106	2,198	5.49	Indus
17	Kohala Hydrpower Project	PPP	1,100	4,800	2,757	6.70	Jhelum
18	Sukhi Kinari	IPP	840	2,951	1,356	6.70	Jhelum
19	Munda	WAPDA	740	2,407	1,893	6.17	Swat

Source: Estimates based on the data collected from WAPDA Hydropower planning and feasibility, and design studies for the projects and actual concessions by NEPRA.

28. Projects 1, 2 and 3 (Allai Khwar, Khan Khwar and Duber Khwar) are located on tributaries of the Indus upstream of Tarbela. Jinnah Hydropower is below Tarbela on a barrage which was constructed in 1948. These projects owned by WAPDA are either commissioned or near completion. Projects 11, 12, 13 and 14 (Thakot, Pattan, Diamer-Basha, and Bunji) are above Tarbela in a sequence. Projects 15 and 16 (Lower Plas Valley and Spat Gah) are on tributaries of the Indus above Tarbela.

29. These costs are based on latest estimates available from the feasibility studies escalated to current costs and therefore do not represent the actual cost of these projects which would have changed over time. For comparative analysis unit rates (US cents/kWh) are calculated based on certain assumptions (i.e. 10 percent discount and 30 years life) applied uniformly to all projects. However, for a few private sector projects/IPPs (Patrind, New Bong and Suki Kinari) where tariffs determined by NEPRA were available, those have been used –NEPRA reference tariffs (levelized over 30 years) after adjusting for exchange rate variation would be US¢ 9.75 and US¢ 10.69 /kWh for Patrind and New Bong respectively. These unit

costs are more realistic while other costs are based on old planning studies and much likely to be higher in reality. The levelized costs (except for those determined by NEPRA) does not include the O&M cost. This, however, wouldn't affect the ranking of these projects.

30. Projects comparable to DHP-I provide generation of more than several thousand GWh such as Bunji, Pattan and Thakot which are also run-of-river projects. The cost estimates for these projects are based on planning studies some of which are old. Their cost is likely to go higher as they involve full scale development, social and environmental costs all of which are likely to increase when actual implementation of the projects starts. Thus the cost per KWh of the planned projects except for DHP presents a conservative estimate. Besides that, DHP-I has the lowest cost among the comparable hydro projects in Pakistan.

31. **Other Sources of Renewable Energy.** The main sources of alternative renewable energy available to Pakistan are small hydro, wind and solar. These options are being actively pursued and have the same beneficial impact in avoiding the environmental externalities of fossil generation. However, the scale and nature of these resources are such that these cannot be viewed as a mutually exclusive substitute for DHP-I. Both of these options need to be developed to the extent technically and financially feasible: they are complements, not substitutes to DHP-I. In order to replace 12,225 GWh of annual energy of DHP-I, at a typical 28% annual load factor the installed capacity of wind/solar would be 5,000 MW, requiring a capital investment of more than US$ 15 billion – over 3.5 times the total financial cost of DHP-I of $4.2 billion. Moreover, from the perspective of mobilizing the necessary finance for the power sector, they do not compete for the same sources of finance: wind and small hydro can be 100% financed from local commercial banks, whose resources are simply not available to large hydro projects. Phrased differently, Dasu will not crowd out the ability to finance small renewables.

32. **Nuclear.** Two nuclear power plants currently operate in Pakistan, and there exist plans for additional nuclear projects, the main justification for which is to diversify the supply mix. However, nuclear projects are designed for year-round base load operation, and cannot substitute for peaking/intermediate duty at annual load factors around 50%, or for projects that support the summer load peaks. Moreover, while the social and environmental impacts of large hydro projects can be mitigated with appropriate social and environmental management plans, the main environmental impact of nuclear power - the disposal of its radioactive waste - has yet to be satisfactorily solved. In short, under no circumstances can nuclear power be considered a mutually exclusive alternative to hydropower in general, or to the Dasu project in particular.

33. **Thermal Generation**. The only plausible thermal substitute for hydropower and DHP-I is combined cycle gas turbine (CCGT), as discussed in the above Section. The problem with gas generation is that Pakistan's domestic gas resources are limited, and such additional amounts as may become available have higher-valued/ranked alternative uses in process industry and the domestic sector. Consequently, at the margin, gas will need to be imported, either by pipeline, or as LNG. Given the high geopolitical uncertainties of pipeline projects, in the medium term the plausible alternative to DHP-I is imported LNG. It is this technology option that is used in the economic analysis where economic benefits of DHP-I are assessed as the avoided costs of LNG-CCGT. As shown in the NTDC's NPSEP LNG-CCGT is that next best alternative.

34. **Alternative Design.** The final engineering design of the Dasu project is the end result of a comprehensive analysis of all of the main design alternatives, including alternate arrangements for phasing, alternative dam axis locations, alternative dam designs, alternatives for waterway configurations, and the number and size of turbines. These alternatives are discussed in Section III D of the PAD. The final choice of dam location benefited from extensive stakeholder consultation and took into account the views of the communities in Dasu likely to be most affected.

D. Project costs and benefits

35. **Costs.** The total financial cost of DHP-I is US$ 4,250 million (US$3,650 million and US$ 600 million for Phase I and II respectively). The economic cost after subtracting price contingencies, taxes and duties and applying standard correction factor (SCF) of 0.9 to the domestic component of the cost is

US$ 3,090 million (US$ 2,667 and 423 million for Phase I and II). The capital cost of Phase-I would be spread over the 7 years whereas the generation could start from the 6th year. Phase 2 construction would start from the 5th year and would take 3 years. The operation and maintenance (O&M) costs are estimated around US$37 million per year approximately equal to US¢ 0.30/kWh or 1% of project cost. E&M would need major replacement after 30 years of operation. However, in present value terms would play a negligible role in the calculation of economic returns.

36. **Benefits.** If the project is operated to maximize total energy, the expected value of average annual generation from DHP-I is 12,225 GWh/year. This represents the energy that would have to be replaced by a thermal alternative, ignoring the minor difference in the units lost between the source of generation (DHP Vs thermal alternative) to the delivery location. Phase wise cost, capacity and generation estimates are summarized in Table 6.6.

Table 6.6: Phase-wise capacity, generation and cost

	Stage I		Stage II		
	Phase-I	**Phase-II**	**Phase-III**	**Phase-IV**	**Total**
Dasu Hydropower	2,796	599	638	656	4,689
Transmission Line	350	0	438	0	788
Social & Environmental Management	504	0	0	0	504
Total, US$ Million	**3,650**	**599**	**1,076**	**656**	**5,981**
Cumulative Capacity, MW	1,080	2,160	3,240	4,320	4,320
Cumulative Generation, GWh	8,058	12,225	18,730	21,485	21,485

37. **Incremental benefits.** The relevant measure of benefits is the willingness to pay (WTP) for non-grid electricity alternatives. WTP is the area under the demand curve to the point of the quantity consumed, a curve that is difficult to establish reliably. What is most easily observed for most consuming sectors (industry, commerce, agriculture) is simply the cost of diesel self-generation. The cost per kWh would be dependent upon the extent of usage (average running hours for machines of given capacity) which needs to be established by survey. Similarly in the domestic sector, in the absence of a grid-connection, lighting is typically provided by kerosene lamps (in conjunction with candles and dry cells), for which costs can again be determined by survey. A small WTP survey (of 142 consumers in six districts of the Punjab) was carried out by Mott Macdonald in January 2011 in connection with T4HP. Since then the retail fuel prices have risen sharply, kerosene price was PKR 80/litre: this is now PKR 102/litre and diesel present price is PKR 110/litre compared PKR 85/litre then. The weighted average WTP is estimated to be US cents 31/kWh (Table 6.7) based on the latest prices and assumed price elasticity of -0.2 for kerosene purchase by the domestic sector. Consumption for non-domestic sectors is likely to be inelastic to price changes.

38. Because of the high rate of transmission and distribution (T&D) losses in Pakistan, the estimate of US¢ 31/kWh does not apply to the entire net output of DHP-I, but only to the electricity sold at the consumer-level, which is some 20 percent less. How much of this loss is non-technical is unclear, but likely to account for at least 25 percent of the total loss. Therefore, the adjustment for the total T&D loss rate is also conservative, because it implies a zero economic benefit to that portion of the T&D loss which is attributable to pilferage.

39. **Non-incremental benefits.** The no-project alternative has little plausibility, since Pakistan's need for power makes it certain that in the absence of DHP-I some other alternative would be built. As noted above, at the margin DHP-I can be assumed to displace the most expensive thermal generation, the avoided costs of which represent the primary economic benefit of the project. This is conservatively assumed to be gas-fired combined cycle generation (CCGT).

40. The economic benefits of DHP-I therefore comprise the avoided variable cost of CCGT generation (mostly the fuel cost), the avoided capacity cost (converted into per kWh based on an assumed load factor of 80%) and the avoided emissions of local air pollutants and of greenhouse gases. In addition,

until the flushing regime begins, there arise life-extension benefits at Tarbela. These benefits have not been quantified in this report, but are expected to be significant, particularly for irrigation.

Table 6.7: Estimate of average WTP (based on avoided costs)

Sector	Assumed Share	WTP	weighted average
		PKRs/kWh	
Agriculture & Commercial	23.0%	31.7	7.3
Domestic (Kerosene)	42.0%	41.4	17.4
Industry (Diesel)	35.0%	23.3	8.2
PKR/kWh			32.9
US¢/kWh			31.3

41. As shown in Table 6.8 the estimated avoided variable cost of CCGT power generation is US¢ 8.6/kwh. This assumes that the imported LNG price will be linked to international crude oil prices at about 60% parity and crude oil price would remain around US$110/bbl. Based on these assumption FOB price for LNG is US$ 11/mmbtu to which US$ 1.5/mmbtu is added for shipping, regasification and 5% is added for transmission to power station at a total cost of US$ 13.13/mbbtu. The estimated avoided economic cost of capacity assuming 25 years life and 12 percent discount rate is US$ 135/kW/year or US¢ 1.9/kWh at 80% plant factor (Table 6.9). The total avoided cost per unit (including fixed and variable component) of US¢ 10.5/kWh for LNG-CCGT (the next best alternative) is used to calculate the economic benefits. These calculations/estimates are based on the technical assumptions for such units provided in the NTDC's NPSEP adjusted to current costs.

Table 6.8: Avoided variable cost of CCGT generation

Crude Oil Price	$/bbl	110
Conversion factor + linkage		0.10
LNG Price, fob	$/mmbtu	11.00
Shipping & Regasification	$/mmbtu	1.50
Price, cif	$/mmbtu	12.50
Supply Margin at 5%	$/mmbtu	0.63
Economic Cost at plant gate		13.13
Efficiency	Percent	0.53
Heat Rate	btu/kWh	6,438
Fuel Cost	$/MWh	84.5
Variable O&M	$/MWh	1.8
Total Variable Cost	**$/MWh**	**86.3**
	US¢/kWh	8.63

E. Carbon accounting and valuation of global externalities.

42. Avoided global externalities constitute a significant benefit of the Dasu project, given that it replaces the GHG emissions of thermal power generation (in the case of the project alternatives), and the emissions associated with diesel self-generation (industrial and commercial sectors) and kerosene (residential sector) in the no project alternative.

43. The project would contribute significantly to the overall GEOs of reducing emissions of greenhouse gases over the life of the project by providing electricity from non-carbon renewable source rather than thermal fuels. In the absence of this project the most suitable electricity generation would be from combined cycle gas turbine (CCGT). It is estimated that project would result in net reduction of 223.4 million tons of CO_2 over its 50 years life The reservoir emissions are estimated around 0.073 million tCO_2 as most of the land in the reservoir area is barren without any vegetation and flows are very high in the river and it is run-of-the-river project. The emissions for construction activities is estimated about 2.11 million tCO_2 including energy use in construction on site and embodied emissions in

construction materials. The baseline generation emission (CCGT) is estimated around 224.67 million tCO_2 (assuming 367.56 gCO_2/kWh) and emission from construction of baseline CCGT would be 0.83 milliontCO_2. The detailed estimated are provided in the Annex 8. The emission reduction would be higher considering the current fuel mix of the country which is overwhelmingly dominated by furnace oil.

Table 6.9: Avoided capacity cost of CCGT generation

Capital Cost	$/kW	950
Adj for tax content (6%)	"	893
SCF (20% domestic cost)	"	18
Adj for SCF	"	875
Life	Years	25
Disc rate		12%
Fixed Capacity charge	$/kW/Year	112
Fixed O&M	"	18
Total Fixed Charges	"	130
Forced Outages		0.04
Adj Fixed Charges	**$/kW/Year**	**135**
Plant Factor		80%
Estimated per unit cost	$/MWh	19.2
	US¢/kWh	1.9

Power Density

44. The power density, measured as watts/m^2 of reservoir area has come into increasing use as a proxy for the GHG efficiency of a hydro project. With a flooded area at full reservoir level of 26 km^2, and a power output of 2,160 MW, the power density of DHP-I calculates to 91 Watts/m^2, which is quite high compared to other hydro projects (Table 1 of Main PAD)

The social cost of carbon

45. The relevant valuation for avoided GHG emissions in economic analysis is the global social cost of carbon, which is not necessarily observable from extent global carbon markets (which also exhibit considerable volatility).[23]

46. Many recent World Bank project assessments, including other hydro projects (such as T4HP), as well as fossil generation projects, have used the lower value of the range given in the Stern Report, namely $29-30/ton CO_2.[24] Some argue for much higher values (the high value in the Stern report is 85$/ton), others argue for lower values A value of $30/ton CO_2 is used for baseline estimate.

Emissions from self-generation and kerosene

GHG emissions in the case of the non-project counter-factual will be higher than in the gas CCGT alternative. First, because self-generation is based on liquid fuels which have higher carbon emissions per unit of heat value; and second because the efficiency of self-generation is lower than in a highly efficient CCGT. The United Nations Framework Convention on Climate Change (UNFCCC) default emission factor for small diesel self-generation units is 800gm/kWh[25] (as opposed to 367.56gm/kWh for gas CCGT).

F. Environmental Costs and Externalities

47. **Methodology.** It is s generally accepted that to the extent possible, environmental impacts should be monetized, and reflected in the economic accounts. The direct costs of the social and environmental

[23] This is true only for the *economic* analysis; in a *financial* analysis that includes revenues from sale of carbon credits, the state of global carbon markets are indeed the relevant reference point.

[24] The Trung Son hydro project in Vietnam used $29/ton$CO_2$; the Medupi coal project in South Africa used $30/ton$CO_2$.

[25] UNFCCC, ACM0002 *Consolidated Baseline Methodology for Grid-connected Electricity Generation from Renewable Sources*

mitigation plans (such as the costs of relocation and resettlement) are clearly economic costs (since they consume real resources). The same is obviously true of the costs of relocation of the Karakoram Highway (KKH). To the extent that highway improvements benefit projects beyond DHP, these should be recorded under the economic benefits of the project (though in this particular example, they are too difficult to be quantified).

48. The treatment of land compensation payments (which are obviously financial costs to the project) in the economic analysis is often misunderstood. In principle, such payments might indeed be interpreted as transfer payments, but only to the extent that these exceed the economic value of lost production.

49. Clearly, the actual costs of construction and resettlement represent an economic cost (consumes economic resources, when appropriately stripped of any tax content). Also, very clearly, the opportunity cost of lost production (by definition) is an economic cost. In other words, one can indeed subtract the financial cost of land compensation but only if one has included the economic cost of lost production as an economic cost.

50. Absent other information, one has to assume that in general, compensation payments according to Government Policy does indeed represent a fair reflection of lost production (income), and hence it is general practice to assume that the economic value of lost production equals the value of the compensation package (adjusted for tax content). In any event, this is a conservative assumption for the economic analysis, particularly where the social and environmental action plans have been constructed with due care.[26]

51. **Avoided local air pollution.** No reliable Pakistan-specific health damage study is available to estimate the local air emission damage costs associated with gas-fired generation. Consequently a representative European damage cost estimate were scaled by the ratio of purchase power parity (PPP) per capita GDP, resulting in a damage cost for NOx emissions of $1,308/ton NOx (Table 6.10). Particulate and SO_2 emissions from gas-fired generation are negligible and can be ignored. Compared to GHG emission damage costs the NOx health damage costs are also negligible, and have no impact on economic returns. The calculation is included simply for consistency with the methodology for the no project alternative where local health damage costs are indeed much higher.

Table 6.10: Damage costs for CCGT generation

	Units	Value
NOx damage cost	€/ton	11,262
	$/ton	14,640
PPP Euro zone per capita GDP	$	30,455
PPP Pakistan, per capita GDP	$	2,721
Pakistan damage cost	$/ton	1,308

52. Damage costs in the case of the counter-factual are significantly higher. This is because emissions from diesel self-generation and kerosene combustion for lighting occur in densely populated areas with low stacks, and are rarely fitted with pollution controls. Moreover, particulate emissions, largely absent from gas CCGT, are particularly damaging to human health: the impact of kerosene use for lighting in confined indoor spaces is comparable to that of smoking. Moreover, in addition to the problems associated with kerosene combustion to produce light, the simple wick lamps used by poor households are a major source of accidents and fires. Table 6.11 shows the assumptions for local health damage costs for self-generation. The analysis assumes a conservative assumption that health damages

[26] Moreover, even if it were true that the Social Action Plan *improved* the life of project affected families (as seems likely in the case of DHP-I), one can argue that this merely compensates for the so-called *non-use value*, the loss of which also constitutes a real economic cost of the project. In this case any excess compensation (over and above that to restore exactly the standard of living previously enjoyed) can be seen as reflecting the loss of non-use values (loss of ancestral lands, graves, religious sites). Given the uncertainty in this respect, it seems reasonable to treat the entire cost of environmental and social action plans as economic costs.

from kerosene lighting are equal to those of diesel generation. Health damage costs are escalated according to the assumed growth of real per capita GDP.

Table 6.11: Avoided local health damage costs for self generation

		unit	NOx	PM-10
1	NOx damage cost, utility emissions	Euro/ton	11,262	12,951
2		$/ton	14,640	16,836
3	PPP Euro zone. per capita GDP	$	30,455	30,455
4	PPP Pakistan, per capita GDP	$	2,721	2,721
5	Pakistan damage cost	$/ton	1,308	1,504
6	ground level emission multiplier	[ ]	1	1
7	Net damage cost	$/ton	1,308	1,504
8	emission factor (AP42)[27]	gms/kWh	18.8	1.34

53. **Negative externalities.** The mitigation of socio-economic and environmental impacts during the construction phase are included as direct project costs. These impacts are temporary and mitigated by the measures proposed in the environmental management action plan (EAMP) and the Social and Resettlement Management Plan (SRMP.)

G. Economic rate of return

54. As shown in Table 6.12 the baseline economic rate of return (ERR) for DHP-I, assessed against the next best alternative (LNG-CCGT), is 25% (NPV US$3.2 billion) and the hurdle rate of 12% is reached already in year 5 of operation. The avoided costs of energy (i.e. the fuel costs of the CCGT) account for the largest share of benefits. The additional benefit (0.3%) of the avoided local environmental benefits is quite small, and that of avoided GHG emissions (when valued at $30/ton CO_2) is an additional 1.7%, for a total of 27.0% (NPV $3.8 billion). Nevertheless, the NPV of the two environmental benefit streams ($640 million) exceeds the total environmental and social mitigation costs of about $ 500 million.

55. **The no-project counterfactual.** When assessed against the no project alternative (Table 6.13), which means against oil-based self-generation and kerosene, the economic returns are significantly higher (ERR 42.6%, NPV $10.5 billion). To the extent that power shortages continue into the next decade, this would be the relevant measure of benefits, since in the first instance power from DHP-I would reduce load shedding to existing consumers before enabling additional loads.

56. Because self-generation (and lighting from kerosene) incurs significant health damage from NOx and PM-10, avoided local environmental costs account for a larger share of the total benefits, and the value of avoided GHG emissions is also higher than gas-CCGT because the avoided emissions are based on oil. Avoided local externalities adds 3.9% to the ERR, and avoided GHG emissions a further 1.7%, for a total of 48.2% (NPV $14.5 billion). These are good rates of economic return comparable to other greenfield hydro projects recently financed by the World Bank (Table 6.15) indeed compared to power sector projects in general. The main explanation for the good economic returns, despite the front-loading of dam costs in the DHP-I, is simply one of unusually high load factor for a run-of-river project (Phase 1: 85% and Phase 1 and 2: 65%) and excellent site conditions where project construction is less costly. The first phase alone has overnight economic investments costs of $2,469/kW; for Stage I (Phase I and II) the average economic cost falls to $1,430/kW. Phase-wise detail is given in Table 6.15. The phase-wise cumulative ERR is given in Table 6.16 showing that each phase is economically viable and overall project ERR improves with each additional phase.

27 US EPA, *Report on Revisions to the 5th edition AP-42, Section 3.3, Gasoline and Diesel Industrial Engines.*

Table 6.12: Economic Returns DHP-I, Baseline Scenario

(figures in US$ million except where indicated)

	Capital Cost		T.		Total	Generation	Total	Net	EIRR	Env. Premium		Total Net
Year	Ph 1	Ph 2	Capital	O&M	Cost	GWh	Benefit	Benefit	%	Global	Local	Benefits
1	267	-	267	-	267	-	-	(267)		-	-	(267)
2	533	-	533	-	533	-	-	(533)		-	-	(533)
3	533	-	533	-	533	-	-	(533)		-	-	(533)
4	533	-	533	-	533	-	-	(533)		-	-	(533)
5	267	85	351	-	351	-	-	(351)		-	-	(351)
6	267	169	436	12	448	4,029	423	(25)		44	4	23
7	267	169	436	30	466	10,142	1,065	598		112	10	720
8	-	-	-	37	37	12,225	1,284	1,247	-4%	135	12	1,394
9	-	-	-	37	37	12,225	1,284	1,247	6%	135	13	1,395
10	-	-	-	37	37	12,225	1,284	1,247	12%	135	14	1,395
11	-	-	-	37	37	12,225	1,284	1,247	16%	135	14	1,396
12	-	-	-	37	37	12,225	1,284	1,247	19%	135	15	1,397
13	-	-	-	37	37	12,225	1,284	1,247	20%	135	16	1,398
14	-	-	-	37	37	12,225	1,284	1,247	21%	135	17	1,399
15	-	-	-	37	37	12,225	1,284	1,247	22%	135	18	1,400
16	-	-	-	37	37	12,225	1,284	1,247	23%	135	19	1,401
17	-	-	-	37	37	12,225	1,284	1,247	23%	135	20	1,402
18	-	-	-	37	37	12,225	1,284	1,247	24%	135	21	1,403
19	-	-	-	37	37	12,225	1,284	1,247	24%	135	22	1,404
20	-	-	-	37	37	12,225	1,284	1,247	24%	135	23	1,405
21	-	-	-	37	37	12,225	1,284	1,247	24%	135	25	1,406
22	-	-	-	37	37	12,225	1,284	1,247	25%	135	26	1,408
23	-	-	-	37	37	12,225	1,284	1,247	25%	135	27	1,409
24	-	-	-	37	37	12,225	1,284	1,247	25%	135	29	1,411
25	-	-	-	37	37	12,225	1,284	1,247	25%	135	30	1,412
26	-	-	-	37	37	12,225	1,284	1,247	25%	135	32	1,414
27	-	-	-	37	37	12,225	1,284	1,247	25%	135	34	1,416
28	-	-	-	37	37	12,225	1,284	1,247	25%	135	36	1,418
29	-	-	-	37	37	12,225	1,284	1,247	25%	135	38	1,420
30	-	-	-	37	37	12,225	1,284	1,247	25%	135	40	1,422
31	-	-	-	37	37	12,225	1,284	1,247	25%	135	42	1,424
32	-	-	-	37	37	12,225	1,284	1,247	25%	135	44	1,426
33	-	-	-	37	37	12,225	1,284	1,247	25%	135	47	1,429
34	-	-	-	37	37	12,225	1,284	1,247	25%	135	49	1,431
35	-	-	-	37	37	12,225	1,284	1,247	25%	135	52	1,434
Total	**2,667**	**423**	**3,090**	**1,082**	**4,172**	**360,638**	**37,867**	**33,695**		**3,977**	**808**	**38,480**
NPV	**1,789**	**210**	**1,999**	**153**	**2,152**	**50,853**	**5,340**	**3,188**		**561**	**76**	**3,824**
EIRR									**25.0%**			**27.0%**

Table 6.13: Economic Returns DHP-I, No Project Alternative

(figures in US$ million except where indicated)

	Capital Cost		T.		Total	Generation	Consumption	Total	Net	EIRR	Environmental Pre		Total Net
Year	Ph 1	Ph 2	Capital	O&M	Cost	*GWh*	*GWh*	Benefit	Benefit	%	Global	Local	Benefits
1	267	-	267	-	267	-	-	-	(267)		-	-	(267)
2	533	-	533	-	533	-	-	-	(533)		-	-	(533)
3	533	-	533	-	533	-	-	-	(533)		-	-	(533)
4	533	-	533	-	533	-	-	-	(533)		-	-	(533)
5	267	85	351	-	351	-	-	-	(351)		-	-	(351)
6	267	169	436	12	448	4,029	3,223	999	551	-43%	97	137	784
7	267	169	436	30	466	10,142	8,113	2,515	2,049	4%	243	363	2,655
8	-	-	-	37	37	12,225	9,780	3,032	2,995	23%	293	461	3,750
9	-	-	-	37	37	12,225	9,780	3,032	2,995	31%	293	487	3,775
10	-	-	-	37	37	12,225	9,780	3,032	2,995	35%	293	513	3,802
11	-	-	-	37	37	12,225	9,780	3,032	2,995	38%	293	542	3,830
12	-	-	-	37	37	12,225	9,780	3,032	2,995	40%	293	572	3,860
13	-	-	-	37	37	12,225	9,780	3,032	2,995	41%	293	603	3,891
14	-	-	-	37	37	12,225	9,780	3,032	2,995	41%	293	636	3,925
15	-	-	-	37	37	12,225	9,780	3,032	2,995	42%	293	671	3,960
16	-	-	-	37	37	12,225	9,780	3,032	2,995	42%	293	708	3,997
17	-	-	-	37	37	12,225	9,780	3,032	2,995	42%	293	747	4,036
18	-	-	-	37	37	12,225	9,780	3,032	2,995	42%	293	788	4,077
19	-	-	-	37	37	12,225	9,780	3,032	2,995	42%	293	831	4,120
20	-	-	-	37	37	12,225	9,780	3,032	2,995	42%	293	877	4,166
21	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	925	4,214
22	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	976	4,265
23	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,030	4,318
24	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,087	4,375
25	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,146	4,435
26	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,209	4,498
27	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,276	4,564
28	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,346	4,635
29	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,420	4,709
30	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,498	4,787
31	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,581	4,869
32	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,668	4,956
33	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,759	5,048
34	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,856	5,145
35	-	-	-	37	37	12,225	9,780	3,032	2,995	43%	293	1,958	5,247
Total	2,667	423	3,090	1,082	4,172	360,638	288,510	89,438	85,266		8,655	30,377	124,298
NPV	**1,789**	**210**	**1,999**	**153**	**2,152**	**50,853**	**40,682**	**12,611**	**10,460**		**1,220**	**2,854**	14,534
EIRR										**42.6%**			**48.2%**

Table 6.14: Baseline economic returns, selected World Bank hydro projects

Project	Country	Date of appraisal	installed capacity, MW	economic capital cost $/kW	ERR (1)	Basis
Dasu Stage I	**Pakistan**	**2014**	**2,160**	**1,430**	**42.6%**	**Incremental**
Tarbela T4	Pakistan	2012	1,410	481	42.1%	Incremental
Bujagali	Uganda	2007	250	2,084	22.0%	Incremental
Ghazi-Barotha	Pakistan	1995	1,450	1,648	27.0%	Incremental
Dasu Stage I	**Pakistan**	**2014**	**2,160**	**1,430**	**25.0%**	**Avoided cost**
Tarbela T4	Pakistan	2012	1,410	481	27.2%	Avoided cost
Trung Son	Vietnam	2010	260	1,302	18.9%	Avoided cost
Fetou	Mali	2009	60	3,316	13.7%	Avoided cost
Rampur	India	2007	412	1,254	20.0%	Avoided cost
Nam Theun 2	Laos	2005	1070	939	16.3%	Avoided cost

(1) As reported in the corresponding project appraisal documents

Table 6.15: Load factors and incremental investment costs

	Installed capacity		Unit cost (1)		Energy (2)		
	Per phase	Total	Per phase	cumulative	incremental per phase	Cumulative	load factor
	MW	MW	$/kW	$/kW	GWh	GWh	[ ]
Phase I	1,080	1,080	2,469	2,469	8,058	8,058	0.85
Phase II	1,080	2,160	392	1,430	4,167	12,225	0.65
Phase III	1,080	3,240	654	1,172	3,319	18,730	0.66
Phase IV	1,080	4,320	389	976	2,775	21,485	0.57

Notes (1) overnight economic costs; (2) under the assumption that flushing will not be required

Table 6.16: Project Returns (Cumulative ERR) under Phased Development (excluding Environmental Benefits)

	Phase I	Phase II	Phase III	Phase IV
Avoided Cost	20.8	25.0	27.1	27.5
Incremental	36.9	42.6	44.5	44.9

Assuming that phases will be commissioned sequentially in years 6, 7, 11 and 12.

H. Project Risks

57. **Construction cost overruns.** Construction cost overruns are the bane of hydro projects. An analysis of cost overruns in World Bank projects[28] as well as a similar analysis of the Report of the World Commission on Dams[29] documents significant issues. In the World Bank study of 71 hydro projects, the average cost overrun was 27%, and the average schedule slip 28%. The cost ratios showed an extremely high standard deviation of 38 percent.

58. However, the Bank's experience in Pakistan appears to be better than average. The 2004 Implementation Completion Report for the Ghazi Barotha project[30] showed that actual project costs ($2,068 million at 2003 prices) were slightly below those estimated at appraisal ($2,250 million).

59. The switching value (i.e. the value at which the ERR falls to the hurdle rate of 12% is $8.0 billion, or 2.5 times the baseline economic cost of $3.1 billion. Cost overruns of this magnitude must be considered extremely unlikely, given the experience of the design consultants and Pakistan's experience with construction of large hydro projects.

60. **Construction delays.** Related to construction cost overruns are the risks of construction cost delays. Depending on the nature of the delay, these may be highly correlated. Where delays are caused by geo-technical problems, especially tunneling, there may be significant additional costs as well. And if these delays occur after a significant portion of the investment cost has been spent, economic returns will also fall. On the other hand, where these delays occur at the beginning of the project, before significant expenditure is incurred, the effect on the project ERR is minimal.

61. For DHP-I two kinds of delays are possible. The first is a delay in the construction of Phase 2. This would be contingent upon the availability of required finances. However, as shown in Table 6.17 even if the Dasu Phase II is never constructed, the returns to Phase 1 (alone) would still be 21%. Therefore a switching value does not exist.

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[28] R.W. Bacon, R. Besant-Jones, and J. E. Heidarian, *Estimating Construction Costs and Schedules: Experience with Power Generation Projects in Developing Countries.* World Bank Technical Paper No. 325, Energy Series, 1996., and Besant-Jones, John E. *"Assigning Probabilities to Scenarios for Risk Analysis - The Case of Hydropower Project Construction Costs*, World Bank, May 2003

[29] World Commission on Dams, 2000. *Final Report on Dams and Development A New Framework for Decision-making to the Framework Convention on Climate Change*.

[30] World Bank, *Implementation Completion Report, Ghazi Barotha Hydro-project*, Report 28781, June 2004.

62. The second type of delay is related to delays under the assumption that the bulk of the construction expenditure has been incurred, but operation is prevented (e.g., litigation from NGOs that prevents a project form being operated). Thus the capital investment stands idle, with no economic benefits realized. The switching value under such a worst case scenario is 8 years for DHP-I. An 8 year delay in commercial operation date (after all investment has been incurred) seems extremely unlikely because DHP is a run-of-rover project with no irrigation storage and therefore downstream riparian issues are not plausible. In short, the economic returns of DHP-I are robust with respect to construction delays.

63. **World Oil Prices.** The switching value for the avoided cost of CCGT generation is US cents 4.24/kWh, about two-fifth of the current estimate (and corresponds to a world oil price of around US$30/bbl. The valuation is dependent on the price of LNG and oil. The extent to which LNG prices will remain linked to world oil prices is uncertain, as is the level of oil and LNG prices. The level of LNG price is important, since it governs the benefit of avoided thermal generation: the higher the price, the greater is the benefit. However, a return to oil prices to 30$/bbl range is not very plausible.

64. **Capacity credit.** The magnitude of the capacity credit is uncertain, and is dependent upon a range of assumptions about the value of the Dasu capacity to the system. However, from the standpoint of the risk to economic returns, the value of the capacity credit is minor. Indeed, even if the capacity credit were zero, the ERR would fall from 25% to just 21.7% (and thus no switching value exists for this input assumption).

65. **Willingness to pay.** The economic returns against the no project alternative are dependent upon the avoided costs of self-generation of electricity and the cost of kerosene for lighting. As noted, some of the assumptions are derived on the basis of very limited surveys, and are therefore subject to high uncertainty. However, the switching value is just 5.3 US¢/kWh, less than one-fifth of the baseline estimate and less than half of the current average consumer tariff (US¢ 11/kWh).

66. **Sedimentation.** Sedimentation rates at the Dasu reservoir have been discussed in detail in the PAD. Higher than expected silt loads potentially affects the project in following ways:

- higher than expected damage to turbine blades, requiring more frequent replacement
- reduction in generation due to flushing requirements if these are taken through the low-level outlets.

67. A flushing program would result in loss of power generation 18.6% in Phase I increasing to 23.3% with Phase 2. The flushing may be needed from the 15th year of operation (if no storage is built upstream of Dasu by that time). Flushing from year 15 has very little impact on economic returns, which are largely determined by the generation in the first decade of operation. And if the flushing program needs to start sooner in year 10 ERR would fall to just 24.4%. The switching value does not exist because even if the flushing starts from year 1 resulting in the loss of 23% of generation from DHP-I ERR would fall to only 20.8%. In this case flushing is assumed to be done every year, that in practice would not be required –it would be required once in every 3 to 5 years, so these estimates are very conservative. It can, therefore, be concluded that the economic returns for DHP-I are robust with respect to sedimentation control programs.

68. **Potential impacts of climate change.** The potential impacts of climate change on the hydrologic regime of the Indus River have been discussed in PAD. The evidence suggests that in a likely scenario of global warming based on IPPC predictions, dry season inflows could reduce by 5-10%. However this could be offset by an expected increase of the precipitation during monsoon of 25 percent.

69. How to translate generalized statements about increases in precipitation and reduction in melt-water shares due to climate change into modelling parameters is a major challenge, and there are few examples in the literature. Simple adjustments to annual generation used in the economic model are at best an approximation, but do give some indication of the sensitivity of returns to long-term changes.

70. To simulate the impact of a gradual change as may be induced by climate change a downward trend on the annual generation was superimposed actual generation. It was found that the long term declines in generation have little impact on economic returns. Even with a 50% decline in inflow (and

generation) by 2040, the returns drop by just a few percentage points. Such a magnitude of inflow decline exceeds even those expected from worst case scenarios of "runaway climate change".[31]

71. It is of course true that such large declines in inflows would have catastrophic impacts on irrigation. But since DHP-I has no impact on downstream irrigation requirements (except to the extent of reducing sediment loads until flushing begins) these potential impacts have no relevance for the economic returns. In short, it may be concluded that even under a worst case scenario of a long-term decline in inflows, the DHP-I economic returns are robust.

72. **Accidental and other Unforeseen risks.** The question for the economic analysis is the extent to which the economic returns are likely to be affected by force majeure events linked to such problems (or indeed by other catastrophic accidents of whatever the cause). However it may be noted that the risk to a hydro project in this regard is not demonstrably greater than to the thermal project that it would replace.

73. Based on the worldwide experience, the most plausible accident scenario at a hydro project involves extensive powerhouse damage to electrical and control systems. But DHP-I economic returns are remarkably robust with respect to such events, as shown in Table 6.17

Table 6.17: ERR under major accident scenarios occurring in Year 2022

Scenario	ERR
Baseline	**25.0%**
a) Powerhouse Damaged in 2022, no 2022 generation, $50million repair costs	22.4%
b) Powerhouse Damage in 2022, no 2022 generation, $100 million repair costs	22.3%
c) Powerhouse Damage in year 2022, no generation in 2022&2023, $200million repair bill	20.1%

74. This resilience follows from the high economic returns, the hurdle rate is reached in the 5th year of full operation, so even if the entire project were closed down after year 6, the economic returns are secured. And as noted above, similar disruptions during the construction period, causing cost overruns and delays, also pose no serious risks to DHP-I economic returns.

Conclusion

75. The switching values analysis is summarized in Table 6.18. One may conclude that the project is robust to the major risk factors, and to the main input assumptions.

Table 6.18*: Switching values for DHP-I*

Input variable	Unit	Baseline value	Switching value	As % of baseline	Comments
Capital cost	$USm	3,090	7,972	258%	Highly improbable
Flushing	Year	No	N/A		
Completion year Delay	Years	0	8	-	Worst case, highly improbable.
Delay in Phase II	Years	No	N/A		
Energy	GWh	12,225	4,712	39%	Highly improbable
World oil price	$/bbl	110	28	25%	Highly improbable
Cost of alt generation	USc/kWh	10.5	4.24	40%	
WTP	USc/kWh	31	5.3	17%	Highly improbable
Climate change, inflow reduction by 2040	% annual decrease	0	13.2%	-	Highly improbable

N/A: not applicable – meaning switching value cannot be determined

[31] Such scenarios typically involve tipping points (such as large methane releases from permafrost regions) that result in positive feedback loops, which then further accelerates climate change.

Risk assessment

76. For the risk assessment, plausible worst and best case scenarios are constructed that combine favorable and unfavorable outcomes across the range of variables identified above (Table 6.19). Plausible worst case represent a set of unfavorable outcomes as have been experienced at many hydro projects – though excluding catastrophic force majeure events (such as earthquakes or war damage), but including accident scenarios within the experience of IFI-supported hydro projects. Similarly the plausible best case reflects events – such as higher than expected oil (and hence gas) prices -- that fall into the range of plausible scenarios. Results of risk assessment show the economic returns to be robust with respect to wide ranges of plausible input assumptions.

Table 6.19: Worst and Best Case Scenario

	Plausible worst case	Baseline	Plausible best Case
Climate change impact	20% decrease in generation by 2035	None	Increased rainy season discharge, 10% additional wet season generation by 2035
First flushing	After 10 years of operation	Not required	Not required
Construction cost overrun	20% increase	None	None
O&M costs	3%	1%	1%
resilience to accidents and security concerns	No generation for one entire year, $100 million repair bill	None	None
World oil price	Fall to $100/bbl	110 $/bbl	Increase to 120$/bbl
ERR DHP-I (v.CCGT)(1)	15.7%	25.0%	26.9%
ERR Phase I (only)	12.7%	20.8%	22.5%

(1) excluding avoided thermal generation externality benefits.

I. Project's Financial Analysis

77. DHP-I will become a significant part of WAPDA Hydel's regulatory asset base and the costs and return on investment associated with this project will be covered through the bulk tariff that WAPDA gets on all of its generation assets[32]. Therefore, project's financial analysis is of little relevance. However, based on the DHP-I costs and the assumed financing structure project specific tariff has been estimated in Table 6.20 to analyze its financial impact on WAPDA, consumers and the power sector in general.

78. The investment schedule and generation profile are same as given in the economic analysis. Total financial cost of DHP-I is US$ 4,250 million. All project cash flows are kept in dollars and an 8% weighted average cost of capital is assumed as the discount rate to calculate the levelized cost which makes the present value of revenue and cost stream equal. The (nominal) levelized financial cost of generation from DHP-I based on these assumptions is US¢ 4.01/kWh, or US¢ 2.93/kWh (or PKR 2.93/kWh assuming PKR 100/USD) at constant 2014 prices using 6% discount rate (net of 2% USD inflation). The 8% discount rate is consistent with the current on-lending interest rate of 15% in rupees (assuming 7-8% historic rupee depreciation) and keeping in view cost of commercial financing. The sectoral impact analysis in the next section is based on PKR 2.93 as cost of generation plus PKR 0.155/kWh for water usage charges (fixed over the life of the project) for a total cost of PKR 3.09/kWh.

[32] WAPDA Hydel's financial analysis (Annex 6B) covers this in detail.

Table 6.20: Project's Financial Analysis

Year	Capital Cost Ph 1	Capital Cost Ph 2	T. Capital	O&M	Total Cost	Disc. Factor	Present Worth	Generation *GWh*
1	365	-	365	-	365	1.02	358	-
2	730	-	730	-	730	1.04	702	-
3	730	-	730	-	730	1.06	688	-
4	730	-	730	-	730	1.08	674	-
5	365	120	485	-	485	1.10	439	-
6	365	240	605	14	618	1.13	549	4,029
7	365	240	605	35	640	1.15	557	10,142
8	-	-	-	43	43	1.17	37	12,225
9	-	-	-	44	44	1.20	37	12,225
10	-	-	-	45	45	1.22	37	12,225
11	-	-	-	46	46	1.24	37	12,225
12	-	-	-	47	47	1.27	37	12,225
13	-	-	-	47	47	1.29	37	12,225
14	-	-	-	48	48	1.32	37	12,225
15	-	-	-	49	49	1.35	37	12,225
16	-	-	-	50	50	1.37	37	12,225
17	-	-	-	51	51	1.40	37	12,225
18	-	-	-	52	52	1.43	37	12,225
19	-	-	-	53	53	1.46	37	12,225
20	-	-	-	54	54	1.49	37	12,225
21	-	-	-	56	56	1.52	37	12,225
22	-	-	-	57	57	1.55	37	12,225
23	-	-	-	58	58	1.58	37	12,225
24	-	-	-	59	59	1.61	37	12,225
25	-	-	-	60	60	1.64	37	12,225
26	-	-	-	61	61	1.67	37	12,225
27	-	-	-	63	63	1.71	37	12,225
28	-	-	-	64	64	1.74	37	12,225
29	-	-	-	65	65	1.78	37	12,225
30	-	-	-	66	66	1.81	37	12,225
31	-	-	-	68	68	1.85	37	12,225
32	-	-	-	69	69	1.88	37	12,225
33	-	-	-	70	70	1.92	37	12,225
34	-	-	-	72	72	1.96	37	12,225
35	-	-	-	73	73	2.00	37	12,225
Total	3,650	599	4,249	1,666	5,915		5,006	360,638
NPV*	2,771	372	3,143	364	3,507		3,487	87,547
Discount Rate					8.0%		6.0%	
Levelized Cost				US¢/kWh	**4.01**		**2.93**	

* At 8% discount rate for nominal and 6% for real/present worth cashflows.

J. Sectoral Impact of DHP-I and Distribution of Benefits

79. Generation from DHP-I will add to the existing generation and to some extent may also replace existing high sulfar furnace oil based generation. In case there is no DHP-I it can be assumed that fuel supply to existing thermal plants will be enhanced to achieve equal additional generation as from DHP-I. The financial impact of DHP-I on the sector and consumers is estimated by comparing the following four scenarios (1) DHP-1 displaces existing furnace oil based generation, (2) DHP-I adds to the existing generation, (3) No DHP-I, and generation equal to DHP-I is achieved through imported (a) natural gas or (b) fuel oil (FO).

80. **Reduction in Generation Cost.** While, tariff for WAPDA Hydel will be higher with DHP-I the overall generation cost will reduce. During the construction phase, however, the impact on average generation cost is going to be negative because even though there will be no generation WAPDA Hydel tariff will increase as it will be getting a return on the work-in-progress. The average generation cost would decline after DHP-I generation starts. Tariff of DHP-I would change over the life of the project; peaking during construction and then declining over operation phase. For the purpose of this analysis, a levelized cost PKR 3.09 at constant 2014 prices (calculated in the above section) is taken to compare with the costs of generation given in FY14 DISCO tariff determinations by NEPRA[33]. The overall cost of generation for the four scenarios is presented in Table 6.21. If it is assumed that DHP-I displaces

[33] As of January 2014, only one tariff determination of LESCO was available. The generation scenario presented in LESCO's tariff determination will be common for all DISCOs.

expensive FO based generation (Scenario 1) then average cost is projected to decline by 19.6% and the share of hydro in the generation mix would increase from 34% (assumed in FY14 NEPRA determinations) to 48%. In this scenario, total generation (excluding KESC) is kept at the current level (88,363 GWh) which will worsen the load-shedding situation as demand would continue to increase. Alternately, if it is assumed that the generation from existing plants would remain at the same level then DHP-I would increase the total generation by almost 14% for a 42% hydro share and generation cost would reduce by 8.6% (Scenario 2). In case, there is no DHP-I (Scenario 3) then it can be reasonably assumed that equivalent generation can be added by supplying more fuel to the existing power plants. LNG is considered as the next best alternative to increase electricity supply within the same time period (Scenario 3-a). Based on the variable energy component of 8.63 PKR/kWh (equivalent to US¢ 8.63/kWh as worked out in the economic analysis section) the average generation cost would decline by 2.3% but will be about 6.9% higher compared to the generation cost with DHP-I. In case equal amount of electricity is supplied through furnace oil at US¢ 18.25/kWh (Scenario 3-b) increase in generation cost would be 8.6% compared to base case and 18.7% if compared with DHP-I.

81. In summary, the induction of DHP-I into the power system would reduce the average generation cost and therefore the overall cost determined for FY14 (latest available) would also decline by about 8 percent. However, if it is assumed that equal generation is met through imported natural gas (CCGT) or fuel oil (FO) costing PKR 9/kWh and PKR 18/kWh respectively using existing plants then the reduction in generation cost will be around 7 and 19 percent.

82. **Impact on Consumers.** The reduction in generation cost as a result of DHP-I would be incorporated in the base tariffs as opposed to monthly Fuel Price Adjustments because 95 percent of WAPDA costs are covered through fixed capacity charges. Provided that other things remain constant DHP-I is expected to reduce the estimated average determined tariff from PKR 13.70 to PKR 12.64. The reduction of about PKR 1.06/kWh (US cents 1.06/kWh) is after adjusting for 14 percent T&D losses allowed by NEPRA. Therefore, lesser increase would be required to achieve the same subsidy target.

83. **Impact on the Sector.** At present (FY13), the power sector is losing around 20 percent in T&D losses (of which around 14.3 percent is covered through tariff) and another 10% in non-collection of revenue. Therefore, a reduced tariff implies a reduction in sector deficit per unit. However, the increased supply would tend to increase the quantum of sector deficit and tariff differential subsidies. If it is assumed that DHP-I will displace existing thermal plants running on imported FO then the sector deficit would be reduced by around PKR 21 billion. If DHP-I increases the total supply the deficit is expected to increase by PKR 6 billion per annum. The tariff differential subsidies on the other hand are expected to decline by PKR 66 billion because the impact of reduction in cost is more than the increase in supply. The subsidies can be largely eliminated if DHP-I displaces expensive FO based generation. The above analysis assumes that the average consumer tariff will be maintained at the current estimated average of PKR 11.75/kWh.

84. In the absence of DHP-I, it can be reasonably assumed that the CPPA would need to purchase the equivalent quantum of energy generated through LNG. The incremental tariff impacts from DHP-I can be compared to the incremental cash purchases for next best thermal alternative. Therefore, sectoral benefits of DHP-I can be estimated by comparing it with equal generation fuelled by imported LNG. Though LNG is also projected to reduce the overall cost of generation but not as much as DHP-I and therefore in case of LNG sector deficit is expected to increase by PKR 14 billion (8 billion more than with DHP-I) and tariff differential subsidies will remain at the same level (compared to PKR 66 billion reduction with DHP-I). The analysis assumes that other factors including the consumer mix and consumer-end tariffs would remain constant.

85. **Foreign exchange savings.** Dasu will result in significant foreign exchange savings. While the FOREX requirement for capital investment is higher, these are dwarfed by the stream of future savings on fossil fuel imports. Assuming 80% parity with crude oil price at $110/bbl the expected savings are 1,642 million per year or US$ 50 billion over its economic life compared to the capital cost of about US$4.2 billion with about 50% foreign exchange cost.

86. Therefore, in addition to reduction in tariffs and subsidies, DHP-I would reduce the sector deficit particularly when compared to alternate thermal generation.

Table 6.21: Estimating Impact of DHP-I on generation cost

Base Case: FY 2013-14 Nepra Determinations for DISCOs

	Generation		Energy Charges		Cost
	GWh	*Share*	*Rs Million*	*share*	*Rs/kwh*
Hydel*	30,055	34%	2,346	0%	0.08
Thermal - FO	31,023	35%	566,182	78%	18.25
Thermal - Gas	20,662	23%	115,266	16%	5.58
Coal	40	0%	148	0%	3.70
HSD	1,301	1%	23,710	3%	18.22
Nuclear	3,641	4%	4,367	1%	1.20
Wind	199	0%	0	0%	0.00
Mixed	1,067	1%	11,202	2%	10.50
Imports	375	0%	3,564	0%	9.50
Total	88,363		726,785		8.22
Capacity Charge			218,136		2.47
Total Geneartion Cost			**944,921**		**10.69**
1) Keeping Generation Constant i.e. DHP-I replaces FO based generation					
Existing Sources - Reduced Generation	76,138		721,810		9.48
DHP - I	12,225		39,505		3.232
Total	88,363		761,315		8.62
Change from Base Case	0.0%		-19.4%		-19.4%
2) DHP-I Increases Total Generation					
Existing Sources - Kept Constant	88,363		944,921		10.69
DHP - I	12,225		39,505		3.23
Total	**100,588**		**984,426**		**9.79**
Change from Base Case	13.8%		4.2%		**-8.5%**
3-a) No DHP-I, LNG as an alternate					
Existing Sources	88,363		944,921		10.69
Alt Generation using LNG	12,225		110,777		9.06
Total	100,588		1,055,698		10.50
Change from Base Case	13.8%		11.7%		-1.9%
Compared to Scenario '2' with DHP-I	0.0%		7.2%		7.2%
3-b) No DHP-I, HSFO as an alternate					
Existing Sources	88,363		944,921		10.69
Alt Generation using FO	12,225		223,106		18.25
Total	100,588		1,168,027		11.61
Change from Base Case	13.8%		23.6%		8.6%
Compared to Scenario '2' with DHP-I	0.0%		18.7%		18.7%

* 95% of hydel tariff is covered through fixed cacpacity charge.

Annex 6B: Entity Financial Analysis
DASU HYDROPOWER STAGE I PROJECT (DHP-I)

1. As a part of the unbundling of WAPDA in November 1998, fourteen companies (4 GENCOs, NTDC and 9 DISCOs) were hived off its Power wing to function as independent commercially oriented entities. Hydroelectric capacity remained within WAPDA under its Power wing.

2. **WAPDA** owns and operates 19 hydropower stations under the generation license issued by NEPRA on November 3, 2004. Total installed capacity owned by WAPDA Hydel (as of June 30, 2013) is 6,751 MW, 88 percent of which is in three plants – Tarbela 3,478 MW, Mangla 1,000 MW and Ghazi Barotha 1,450 MW (totaling 5,928 MW). Under-construction/on-going projects include Tarbela Fourth Extension (1,410 MW), Duber Khwar (130 MW), Jabban Rehab (22 MW) and Golen Gol (106 MW) for a total installed capacity of 1,668 MW. Though Neelum Jhelum Hydropower Project (NJHP) is fully owned by WAPDA it is structured as a Special Purpose Vehicle (SPV) and therefore does not form part of WAPDA's asset base for the purpose of tariff calculations. Dasu Hydropower Stage I (DHP-I) would add another 2,160 MW. WAPDA maintains separate accounts for all of its three wings (Power, Water and Finance each headed by a Member of the Authority with power of Managing Director) and are then consolidated into total WAPDA. These accounts are audited by the auditor general of Pakistan. The financial accounts of its power wing also referred to as WAPDA Hydel (under which generation assets are booked) are also audited by the commercial auditors as per the requirement of NEPRA. These audited accounts are used as the basis for WAPDA Hydel's financial analysis presented here.

3. **NTDC** purchases power from the generation companies including WAPDA. Its single buyer and seller responsibilities are handled by its subsidiary, the Central Power Purchasing Agency (CPPA), which buys directly all power generated from public sector plants, and the new IPPs. It buys the power generated by old IPPs through the Power Purchase Organization (PPO) located in WAPDA for certain historical reasons. The CPPA then sells the purchased power on pooled average prices to the DISCOS and some bulk buyers. Sales to KESC are considered as export. The CPPA's responsibilities include the collection of dues from its buyers and paying its bills to its sellers.

4. Electricity generated by WAPDA Hydel is sold to CPPA at the tariff determined by NEPRA. The electricity generated by DHP-I would go to the pool of electricity generated by WAPDA Hydel and would be sold at the tariff given to WAPDA Hydel by NEPRA for all electricity it generates and not separately for DHP-I or for any other project it undertakes. Rather than a project financial analysis, what is more relevant is the financial standing and balance sheet of WAPDA Hydel, the tariff it gets from NEPRA, past and future finances of WAPDA Hydel, and its ability to remain a financially viable entity covering all its costs and with the capacity to undertake proposed investments for expansion of hydropower generation. In this Annex, the impact of DHP-I on WAPDA Hydel financial viability and how the project fits into WAPDA's overall hydropower development program is analyzed using a scenario analysis by which DHP-I is added sequentially to WAPDA's other on-going projects

5. **Tariff for WAPDA Hydel.** NEPRA, the state regulator, determines bulk tariff for WAPDA Hydel on a cost plus basis covering WAPDA Hydel's annual revenue requirement calculated as a sum of O&M expenses, depreciation, water usage charges and hydropower profit payable to provincial governments, return on regulatory asset base minus other income (such as dividends from the privatized Kot Addu Power Company shares). The rate of return assures a reasonable profit and provides an incentive for continuous investment. The methodology for tariff estimation can be expressed by the following equation:

Revenue Requirement = Return on Asset + Depreciation Expense + O&M + Ijara Rental + Other Charges – Other Income [+/-] prior period adjustments

Where,

Variable	*Description*	*PKRs Million**
ROA	Product of weighted average cost of capital (WACC), reassessed at the time of each determination, and average regulatory asset base. Asset base includes net fixed assets in operation (valued at historic cost) and work-in-progress.	*31,209*
Depreciation	Assets are depreciated based on economic useful life – 50 years for dams and reservoir, 30 years (average) for generation plant & equipment, and varies from 4-10 years for other asset classes.	*5,182*
O&M	O&M expenses include repair & maintenance, salaries & wages and other administrative & general expenses. For staff retirement benefits NEPRA takes actual benefits paid to the retirees as oppose to the actuarial estimates given in the financial statements.	*7,442*
Ijara Rental	Rental paid on the leased assets. WAPDA re-financed some of its existing assets using Sukuk Islamic financing (sale and lease back arrangement ending in 2017). The rental amounts are covered through tariff.	*1,506*
Other Charges	These are pass-through costs that WAPDA has to pay to provinces and other entities. It includes (i) Water Usage Charges to northern areas, (ii) Net Hydel Profit to KPK government and (iii) IRSA charges.	*6,901*
Other Income	Income generated from other sources e.g. interest income, profit on investments etc. is deducted from the revenue requirement. A major share of this is the income received from privatized KAPCO shares.	*(-) 4,115*
Revenue Gap/Prior Period Adjustment	Adjustments resulting from variance between estimated and actual costs. It also includes compensation for lost revenue due to delays in tariff determination and notification.	*8,797*
TOTAL	Annual revenue requirement to be covered through tariff	*56,982*

** Estimated values assessed by NEPRA in Tariff Determination (dated December 18, 2013) for FY2013-14*

6. Like the nature of expenses that are largely fixed, 95 percent of the revenue requirement is met through fixed capacity charge translated into PKRs/kW/month and the remaining 5 percent is met through variable energy charge in PKRs/kWh. This minimizes the impact of hydrological risk on WAPDA's revenues. Any variation in revenue due to change in generation, however, will be adjusted in subsequent determinations. WACC is reassessed at the time of each determination and reflects the actual cost of debt which ensures that any variation in average interest rate (including those resulting from exchange rate movement) is passed on through the tariff. Return on assets and depreciation expense provides for debt-servicing and re-investment. The asset base return formula imposes two limitations on WAPDA – (i) the average loan life should be as close as possible to the average life of the assets and (ii) it limits the cash available for re-investment. The analysis, however, shows that by gradually building its assets base WAPDA can enhance its re-investment potential both in terms of percentage as well as absolute amounts. The current tariff formula, therefore, is not considered as a major constraint as it provides adequate returns to WAPDA to meet its debt servicing obligations and long-term investment needs simultaneously. The tariff methodology can be modified to augment WAPDA's investment potential for accelerated development of country's hydropower program. There are several ways of doing so e.g. by changing the return formula to self-financing ratio which used to be the case prior to un-bundling of WAPDA, by providing higher return on assets equal to IPPs who are allowed 17% in dollar terms, by imposing hydro development surcharge similar to NJ Surcharge, and/or excluding other income from its tariff calculation which WAPDA can re-invest. Basically, all of these options means higher tariff for WAPDA but by injecting low cost hydropower the overall generation cost will reduce. This analysis is based on the existing asset-based return formula.

7. The latest tariff determination was made by NEPRA on December 18, 2013 after a gap of about 2 years. Component-wise break-up is given in table above. Return on the rate base has increased from

13.72% to 15.22% to account for the increase in the actual cost of debt from 9.70% in FY2011-12 to 12.48% for FY2013-14. Based on this determination, the current tariff for electricity generated by WAPDA Hydel is Rs 1.79 per kWh (with prior year adjustment) applicable for one year after which it will be PKR 1.52 per kWh. The same tariff methodology would be applied to electricity generated by DHP-I, as it would be added to pool of generation by WAPDA Hydel.

8. **Past and Future Finances of WAPDA Hydel.** For the past many years WAPDA Hydel tariff has remained around PKRs 1/kWh. The first significant increase came in FY12 when average tariff increased by almost 40% to PKRs 1.41/kWh and remained around PKRs 1.46/kWh during FY13 as tariff was not determined for FY13. WAPDA Hydel tariff is low, compared to other sources of generation including Hydro IPPs, because most of the assets are fully depreciated and that has a direct bearing on the revenue requirement in terms of depreciation allowance as well as return on rate base. Even at these low tariffs WAPDA has been able to maintain its profitability. The review of last three years' (FY11, 12 and 13) audited financial statements of WAPDA Hydel regulated business only[34] shows that WAPDA Hydel is in a good financial position with its accumulated retained earnings as of end June 2013 at PKRs 79 billion and only 30 percent of PKRs 269 billion revalued net fixed assets including work-in-progress are financed through long-term debt. The net profit for last two years is PKRs 9.9 billion and Rs 11.9 billion to yield around 8% return on regulated asset base valued at historic cost. The return on investment are less than corresponding rates allowed by NEPRA because of following key reasons: (i) difference between historic cost used by NEPRA and re-valued costs used in the preparation of the financial statements resulting in higher depreciation expense and thus lower income, (ii) NEPRA has taken the actual cost paid for retirement benefits whereas financial statements assumes higher costs based on actuarial estimates as per international accounting standards, (iii) income from other long-term investments are not part of regulated business financial statements and is treated as GOP investment, this income prior to FY12 was accounted as other income in the income statement, (iv) timing issue particularly with rising costs – FY12 determinations were notified with a lag of six months and FY13 determinations were not given at all. The above factors, however, except for delays, do not affect the cash flow and therefore actual return if adjusted for these factors would be close to NEPRA determined level. WAPDA Hydel is maintaining a current ratio of well above 1 (1.40x in FY12 and 1.65x in FY13). DSCR measured as earnings before interest and taxes divided by debt service fell below 1 in FY13. This could be attributed to the same factors mentioned for the low return on investment. In addition, PKR 8 billion bullet payment was made against first Sukuk financing which also reduced the DSCR for FY13. It is worth noting that WAPDA as a whole including WAPDA Hydel is exempt from paying income taxes on its profits so that maximum amount can be reinvested in hydro projects. The returns/cash-flows allowed by NEPRA are sufficient to fulfill all financial obligations provided that determinations are on time and NTDC/CPPA remains current in its payments to WAPDA. This leads the discussion to the next issue of liquidity crisis in the power sector affecting all companies in the energy chain including WAPDA Hydel and how those risks can be mitigated for WAPDA.

9. As of end June 2012, WAPDA Hydel's trade debt i.e. receivables from NTDC/CPPA for the electricity sold were PKR 83 billion (equivalent to 760 days turnover). WAPDA, however, was managing its working capital by delaying the payment to the government on the relent loans which as of end June 2012 had accumulated to PKR 49 billion. For this reason, WAPDA also hesitated to borrow directly as it was unsure about the certainty of its cash flows and therefore almost 90% of the borrowing is through the government either in the form of cash development loan or loans provided by multi and bi-lateral development agencies re-lent to WAPDA. US$ 840 million (loan plus credit) for Tarbela fourth extension

[34] WAPDA maintains separate accounts for its hydropower operations, which are generally audited by the Auditor General of Pakistan. In March 2010, at the request of NEPRA, WAPDA appointed M/s Ernst & Young Ford Rhodes Sidat Hyder as an independent external auditor. WAPDA Hydel separated the accounts for regulatory (associated with power generation) and non-regulatory (investments) activities in its FY12 audited financial statements. The non-regulatory activities were separated to prepare a case for excluding other income from tariff determination. NEPRA, however, did not accept the petition for FY2013-14 made on this basis. In this analysis, therefore, income from investment is subtracted while calculating tariff (as determined by NEPRA) and is retained by WAPDA Hydel as government's investment.

project was on-lent to WAPDA using the similar approach. Despite a strong balance sheet, the uncertainty around cash flows has limited WAPDA's ability to raise financing on its own and is considered as a major impediment in the development of large hydropower projects. The problem of non-payment to WAPDA was also a concern when Tarbela Fourth extension project was being appraised by the Bank. Therefore, one of the legal covenants under the loan agreement with the government required the opening of the Escrow Account to maintain a minimum balance of two months equivalent of sales through which payments were to be made to WAPDA on its monthly invoices. The Escrow Account became operational in 2013 and solved the flow issue to a large extent. The stock of outstanding receivables, however, remained as a blot on WAPDA's balance sheet. Later in June 2013, government while clearing power sector circular debt of PKR 480 billion also cleared WAPDA's balance sheet. As a result, FY14 has given WAPDA a fresh start and a clean slate with normal trade debts of PKR 6.3 billion (54 days receivable turnover) and zero outstanding debt liability to the government, which as of March 2014 are around the same level. The escrow account and clearance of outstanding receivables has now paved the way for WAPDA to borrow directly from commercial banks, issue bonds etc. to fast track its hydropower development program.

10. Analysis of WAPDA Hydel's future finances requires, among other things, the projected cost of the investments it is planning to undertake in expanding hydropower generation and the tariff it would get in future. A financial model was developed for this. Using this model financial projections were made over a period of 25 years from FY14-38. For the investment program, three scenarios were developed, as described below.

- **Scenario A.** This covers existing generation capacity and ongoing investments. The existing capacity is 6,751 MW and ongoing capacity installation is 1,668 MW, consisting of 4 projects. These are Golen Gol (106 MW), Duber Khwar (130 MW), Jabban Rehab (22 MW) and Tarbela 4th Extension (1,410 MW). Duber Khwar and Jabban are expected to be commission during FY14 and Golen Gol and Tarbela 4th Extension are expected in FY16 and FY17 respectively.
- **Scenario B.** Scenario A plus DHP-I, i.e., addition of 2,160 MW capacity. Thus total capacity of 6,751 MW plus 3,828 MW including 1,668 MW of other ongoing plants; and
- **Scenario C.** Scenario B plus other priority projects adding about 21,305 MW capacity over the next 20 years or so. These include development of Indus Cascade – Diamer-Basha (4,500 MW), Dasu Stage II (2,160 MW), Tarbela 5th Extension (1,000 MW), Pattan (2,800 MW), Thakot (2,800 MW) and Bunji (7,100 MW), and projects on other river basins include Kurram Tangi (83 MW), Keyal Khwar (122 MW) and Munda (740 MW) for a total of 25,133 MW including 3,828 MW under scenarios 'A' and 'B'.

11. Based on the above investment program and tariff estimation according to the prevalent NEPRA methodology (explained above), the financial projections for WAPDA Hydel were modeled for the next 25 years. Other major assumptions and risk factors are described below.

- Project base costs were taken from NTDC power system expansion planning study 2011 (NPSEP) escalated to 2013 costs using USD inflation rate. Sequencing and investment schedule was prepared in consultation with WAPDA. The hydro development strategy includes simultaneous development of mid-term and long-term projects to keep the tariffs under control and focuses on the development of Indus Cascade as a top priority. Costs are bifurcated in foreign (US$) and local (PKR) components, escalated at their respective inflation rate. Rupee is projected to depreciate at 5.5% (year 1) 4.5% (year 2) and then 3.5% assuming that an IMF program will be in place.
- For dual purpose projects, cost was allocated between the Water and Power wings based on expected benefits – cost portions allocated to WAPDA Hydel/Power Wing are Kurram Tangi-30 percent, Munda-80 percent and Diamer-Basha-60 percent. The analysis assumes that remaining

portion of the cost would come from other sources e.g. government contribution, grants, and financing not to be covered through hydropower tariffs.

- Plant factors are based on estimated annual average. However, as 95% of the revenue requirement is covered through fixed capacity charge any variation in generation will not impact WAPDA's financial viability. Any minor loss in revenue due to variation in sales will be compensated in the next tariff determination.

- Financing Plan. Self-financing ratio is projected to improve gradually from 10% for Tarbela Fourth Extension (on-going project) to 15% for Dasu Stage I and goes upto 25-30% for subsequent phases of Dasu and later projects. The equity for the DHP-I and other project during earlier years is kept low because maximum funds will be diverted to the completion of on-going projects (including Neelum-Jhelum) and for the development of long gestation projects requiring higher equity share. It is assumed that PKR 6 billion per annum will be invested/lent to NJHP from WAPDA Hydel tariff revenue till its completion in 2017. For simplicity, funds are assumed to be disbursed in the same ratio throughout the construction phase. WAPDA's overall debt-equity ratio/capital structure is one of the key variables (used in the analysis as projects are financed under corporate financing structure in which loans will be given to WAPDA instead of the project which makes individual projects financing structure less relevant.

- At present, WAPDA relies mainly on internal cash generation from tariff revenue and loans available through the government. T4HP is being financed through similar mechanism – the World Bank Loan and Credit were re-lent to WAPDA at 15% fixed interest rate charged by the government in-lieu of exchange and interest rate risks borne by the government. DHP-I assumes about US$588.4 million IDA credit for preparatory/start-up activities will be on-lent to WAPDA. 15% of capital cost pre-IDC will be financed through equity and balance will be arranged through additional IDA, commercial banks and export credit agencies etc. using the World Bank guarantees (if needed). Detailed financing plan for DHP-I is given in Annex 2. DHP-I is expected to play a major role in strengthening WAPDA's balance sheet and it is envisaged that subsequent phases of Dasu and other later projects e.g. Pattan and Thakot will be developed by WAPDA through commercial financing using its own balance sheet. The commercial financing is expected to be costlier but this diversity is essential to increase the pot of the available funds and accelerate hydro development.

- In case of direct borrowing by WAPDA, any variation in interest payment and outstanding loan amount due to exchange rate fluctuations would become part of its cost of debt and therefore would be covered through a WACC (weighted average cost of capital) based return formula.

- The analysis also assumes that account receivables turnover will not go beyond 60 days.

12. Key results for each Scenario are presented in Tables 6.24, 6.25 and 6.26 (including 3 years historic data in shaded columns), covering a period from FY11-28 and then till FY38 at 5 year intervals.

13. The tariff is directly proportional to the investment program; with on-going projects alone, in Scenario 'A', it reaches a maximum of PKR 2.15/kWh (nominal terms) in 4 years (FY17). Similarly, in Scenario 'B' DHP-I increases the average tariff to PKR 3.64/kWh in 7 years (FY20). The average tariff increases during the construction period and falls after the projects are commissioned. It continues to decline as projects are depreciated overtime. Scenario 'B' improves WAPDA hdyel cash-flows and if available funds are not invested in other hydro assets will be deposited in short-term investments and the income thus generated is deducted from the revenue requirement. This can also be viewed as an incentive for WAPDA to re-invest whatever is available. For a realistic scenario, however, it is assumed that the income earned on short-term investment will not be deducted from the revenue requirement because in reality WAPDA would either invest the excess cash for the development of hydro projects (or these funds will be paid out as dividends). Scenario 'C' represents this case, in which other priority projects are also started in parallel to match with the availability of funds. The tariffs in Scenario 'C' steadily increase to PKR 11.17/kWh (in FY33) along-with the gradual increase in the asset base. In real terms (net of

inflation) this increase is less than 2.5 times the current tariff and is far below the cost of alternate generation.

14. It is assumed that a major share of DHP-I will be financed through commercial financing. Terms of these commercial loans, however, are unlikely to be as favorable as concessional loans provided by multi- and bi-later development agencies e.g. compared to a typical re-payment period of 20 years the loan may have to be repaid over a shorter period whereas cost of the generation assets are recovered over 30 years through depreciation charge. Though terms of commercial loans are to be negotiated between WAPDA and the lenders, the analysis assumes 7 year grace period and 13 year repayment period. In all three scenario, based on these assumptions, the DSCR and the current ratio remains significantly higher than 1. High net working capital and current ratio in Scenario 'A' and 'B' signifies excess cash flows that WAPDA can reinvest. Reduction in grace and repayment period will tend to deteriorate WAPDA's financial viability measured in terms of Debt Service Coverage Ratio (DSCR) and current ratio. In Scenario 'C' if grace period is reduced to 5 years both DSCR and the current ratio fell below 1 from year 15 to 20 stressing WAPDA's cash flows. The current ratio also fell below 1 for year 17 to 19 when the repayment period was reduced by 3 years. The DSCR, therefore, depends on the terms of the loan and the investment program. Over the next 20 years WAPDA's assets under Scenario 'C' are expected to grow by 16% per annum and almost 63% will be financed through loans mostly commercial. The DSCR, however, does not fall by much compared to Scenario 'B' because as soon as WAPDA invests in other projects it would start earning return on its investment including the work-in-progress. Secondly, equity has been maximized for other projects as more funds become available increasing the self-financing ratio (three years moving average) from 18% in the beginning to 33% towards the end of the projection period. Thirdly, grace period, particularly for the large projects which are likely to be financed through concessional loans, is matched with the construction period and this increases the average loan-life. DSCR will further improve if income from investment in non-regulatory assets (mainly KAPCO dividends) is added to earnings before interest and taxes. Presently, income from non-regulatory assets is treated as equity. Alternate options which could help improve financial viability are (i) negotiate and extend the terms of the commercial loan with lenders, (ii) re-work tariff formula to enhance WAPDA cash-flows to ease out its financial burden, (iii) short-term borrowing, (iv) delay planned investments.

15. Therefore, in a portfolio approach DHP-I is the least cost addition compared to other hydropower plants in the investment pipeline and its quick implementation would help in improving WAPDA's financial position by increasing its rate base while abating the tariff increase compared to long gestation projects. For the sake of analysis Scenario 'D' was simulated (i.e. Scenario 'C' without Dasu HPP) and resulted in higher tariff and lower generation.

16. The analysis shows that WAPDA's investment capability would increase over time along with its asset base as DHP-I is added to the portfolio. Scenario C assumes a steadily increasing investment program meeting DSCR, current ratio and financing limitations. In order for WAPDA to follow more aggressive growth or undertake a major hydropower project in Scenario C earlier or in addition to those included in Scenario C over the next 15-18 years, NEPRA would have to provide higher tariffs, either by allowing higher return on asset base or by adopting a different mechanism, e.g., meeting target self-financing ratio or establishing a special purpose vehicle (SPV). This would mean a slightly higher tariff but far lower than comparable thermal based generation plants, which is several fold more from CCGT, estimated at around US cents 10.5/kWh, and willingness to pay, which is estimated around US cents 24/kWh (at station gate). Another approach would be to create an SPV similar to Neelum Jhelum Hydropower Company.

17. Any adverse outcome either in terms of delay in tariff determination or non-collection could jeopardize WAPDA's financial position. Another risk is the depreciating rupee which increases the debt servicing of foreign loan when denominated in rupees. For example, non-determination of FY13 tariff resulted in a shortfall of PKR 9 billion which was more than 50% of the capital expenditure. WAPDA was subsequently allowed to cover this lost revenue in FY14 determination but such delays if occur on a

recurring basis could affect projects' construction schedules and in failure to meet other financial commitments. Similarly, non-payment by CPPA could also reverse WAPDA's financial position drastically. If collection rate reduces to 90% WAPDA will be unable to fulfill its financial obligations (i.e. zero self-financing ratio and DSCR of less than 1 from year 11 onwards and if it reduces to 75% the financial crisis will hit WAPDA much earlier in year 5. The analysis shows that WAPDA is most vulnerable to non-payment by CPPA. A depreciating rupee will increase the cost of the project leading to some funding gap. DSCR, however, can be maintained around the same level with depreciating rupee because exchange loss will become part of the cost of debt and is recovered through tariff. Delay in NEPRA tariff determination could delay the projects but as these costs are eventually recovered it does not affect long term financial viability of WAPDA Hydel.

18. To minimize the financial distress, WAPDA needs to do a rigorous follow up with NEPRA for rate adjustment and the government also needs to ensure that the escrow account remains functional. Realizing the importance of hydropower in the generation mix as a sustainable solution to power sector issues, the government has ensured that WAPDA gets its share of revenue which would help in the development of hydropower projects. Whereas, prior to the opening of the Escrow Account WAPDA used to have least priority in terms of payments because unlike thermal IPPs and GENCOs it did not have to pay for the variable fuel cost. Its importance has been reflected in the National Power Policy 2013 which states that maximum delay limits for payables set for FO and gas should apply to hydropower IPPs and WAPDA.

Table 6.22: Past and Future Finances of WAPDA Hydel Under Scenario A (Ongoing)

	FY11	*FY12*	*FY13*	*FY14*	*FY15*	*FY16*	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*	*FY22*	*FY23*	*FY24*	*FY25*	*FY26*	*FY27*	*FY28*	*FY33*	*FY38*
				Projected																
Capacity, MW	6,516	6,516	6,612	6,751	6,903	6,903	7,359	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,419	8,419
Net Electrical Output, TWh	31.7	28.2	29.3	31.1	31.8	31.9	33.2	36.1	36.1	36.2	36.1	36.1	36.1	36.2	36.1	36.1	36.1	36.2	36.1	36.1
Plant Utilization Factor, %	56%	49%	51%	53%	53%	53%	51%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%
Average Tariff, Rs/kWh	1.06	1.41	1.46	1.56	2.11	2.06	2.15	2.03	2.00	1.99	1.99	1.99	1.99	1.98	1.98	1.98	1.98	1.97	2.01	2.10
Income Statement																				
Sales Revenue	33	40	43	48	67	66	71	73	72	72	72	72	72	72	72	71	71	71	73	76
Operating Cost*	20	26	27	32	34	36	39	41	42	43	44	46	47	48	46	47	48	50	60	72
Operating Profit	14	14	16	16	33	30	33	33	30	29	27	26	25	23	26	25	23	21	13	4
Net Profit	8	10	12	7	25	23	26	30	35	41	48	57	66	76	92	106	121	139	269	518
Balance Sheet																				
Net Fixed Assets in Operatio	127	187	216	229	217	214	286	271	256	242	227	212	198	183	172	162	152	142	92	41
Work-in-progress	60	65	52	42	65	85	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Other non-current assets	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Long-term Liabilities	61	66	78	88	107	132	153	152	150	146	142	137	135	132	130	128	127	124	125	149
Net Working Capital	20	30	17	29	58	85	118	164	214	267	328	396	476	566	668	785	916	1,065	2,176	4,287
Financial Ratios																				
Operating Margin	41%	35%	37%	33%	49%	45%	46%	44%	42%	40%	38%	36%	34%	33%	36%	35%	32%	30%	18%	5%
Net Margin	25%	25%	28%	15%	37%	35%	37%	42%	48%	57%	67%	79%	92%	106%	129%	149%	170%	194%	371%	683%
Current Ratio	1.37	1.40	1.65	2.89	5.30	7.90	10.08	12.08	15.33	16.13	19.90	23.63	30.66	36.04	42.60	52.37	57.80	64.13	154.05	355.81
Interest Coverage	2.74	3.45	4.26	1.82	3.31	2.69	2.61	2.75	3.09	3.60	4.26	5.14	6.27	7.72	9.97	12.52	15.69	19.91	103.47	2607.02
Debt Service Cover	1.17	1.38	0.93	1.11	2.16	1.88	2.03	2.12	2.21	2.53	2.62	3.12	3.66	4.70	5.84	7.10	9.04	10.37	42.53	308.41
Debt Service Cover-Adj		1.58	1.02	1.28	2.29	2.00	2.13	2.21	2.28	2.61	2.69	3.20	3.74	4.79	5.94	7.21	9.17	10.49	42.82	309.49
Return on Rate Base	9%	9%	9%	8%	16%	15%	17%	18%	20%	23%	26%	30%	35%	42%	51%	61%	72%	86%	227%	750%
Return on Rate Base - Adj.	11%	10%	10%	9%	17%	16%	17%	18%	21%	24%	27%	31%	36%	42%	52%	62%	73%	87%	229%	753%
Return on Equity	3%	6%	6%	4%	11%	10%	10%	11%	11%	11%	12%	12%	13%	13%	13%	14%	13%	13%	13%	13%

Table 6.23: Past and Future Finances of WAPDA Hydel Under Scenario B (A Plus DHP-I)

	FY11	*FY12*	*FY13*	*FY14*	*FY15*	*FY16*	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*	*FY22*	*FY23*	*FY24*	*FY25*	*FY26*	*FY27*	*FY28*	*FY33*	*FY38*
				Projected																
Capacity, MW	6,516	6,516	6,612	6,751	6,903	6,903	7,359	8,419	8,419	8,419	9,499	10,579	10,579	10,579	10,579	10,579	10,579	10,579	10,579	10,579
Net Electrical Output, TWh	31.7	28.2	29.3	31.1	31.8	31.9	33.2	36.1	36.1	36.2	44.1	48.3	48.3	48.4	48.3	48.3	48.3	48.4	48.3	48.3
Plant Utilization Factor, %	56%	49%	51%	53%	53%	53%	51%	49%	49%	49%	53%	52%	52%	52%	52%	52%	52%	52%	52%	52%
Average Tariff, Rs/kWh	1.06	1.41	1.46	1.56	2.22	2.40	2.75	2.90	3.18	3.64	3.30	3.06	3.05	3.02	3.00	2.98	2.96	2.94	2.93	2.88
Income Statement																				
Sales Revenue	33	40	43	48	71	76	91	105	115	132	145	148	147	146	145	144	143	142	141	139
Operating Cost*	20	26	27	32	34	36	39	41	43	51	62	66	68	70	68	69	71	73	84	99
Operating Profit	14	14	16	16	36	40	52	64	72	81	83	82	79	76	77	75	72	69	57	40
Net Profit	8	10	12	7	26	25	28	32	35	41	47	54	64	74	90	105	121	139	275	534
Balance Sheet																				
Net Fixed Assets in Operatio	127	187	216	229	217	214	286	271	256	639	685	656	627	598	573	549	524	500	378	256
Work-in-progress	60	65	52	42	106	199	222	319	404	81	23	23	23	23	23	23	23	23	23	23
Other non-current assets	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2
Long-term Liabilities	61	66	78	88	142	230	326	411	488	561	557	538	515	490	464	437	407	375	194	188
Net Working Capital	20	30	17	29	53	72	96	133	177	233	289	356	427	507	598	702	819	952	1,969	4,184
Financial Ratios																				
Operating Margin	41%	35%	37%	33%	51%	53%	57%	61%	63%	61%	57%	55%	54%	52%	53%	52%	50%	49%	40%	29%
Net Margin	25%	25%	28%	15%	37%	32%	30%	30%	31%	31%	32%	37%	43%	51%	62%	73%	84%	97%	195%	385%
Current Ratio	1.37	1.40	1.65	2.89	4.94	6.85	8.40	10.01	12.51	13.25	7.69	8.86	9.60	10.86	12.40	14.30	15.96	17.80	33.51	229.26
Interest Coverage	2.74	3.45	4.26	1.82	3.10	2.28	2.02	1.94	1.92	1.96	2.02	2.18	2.41	2.70	3.15	3.64	4.25	5.06	19.15	160.11
Debt Service Cover	1.17	1.38	0.93	1.11	2.12	1.77	1.74	1.71	1.67	1.72	1.70	1.35	1.43	1.49	1.66	1.83	2.04	2.26	4.64	53.28
Debt Service Cover-Adj		1.58	1.02	1.28	2.25	1.85	1.80	1.76	1.71	1.75	1.73	1.37	1.45	1.51	1.68	1.85	2.07	2.28	4.66	53.46
Return on Rate Base	9%	9%	9%	8%	16%	14%	14%	15%	15%	15%	16%	18%	19%	21%	24%	27%	30%	34%	71%	185%
Return on Rate Base - Adj.	11%	10%	10%	9%	17%	15%	15%	15%	15%	16%	17%	18%	20%	22%	25%	27%	31%	35%	71%	185%
Return on Equity	3%	6%	6%	4%	12%	10%	10%	11%	11%	11%	11%	12%	12%	12%	13%	13%	13%	14%	14%	13%

Table 6.24: Past and Future Finances of WAPDA Hydel Under Scenario C (B Plus Future Projects)

	FY11	*FY12*	*FY13*	*FY14*	*FY15*	*FY16*	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*	*FY22*	*FY23*	*FY24*	*FY25*	*FY26*	*FY27*	*FY28*	*FY33*	*FY38*
				Projected																
Capacity, MW	6,516	6,516	6,612	6,751	6,903	6,903	7,359	8,502	8,502	9,624	10,704	11,784	11,784	11,784	12,524	14,774	18,104	19,184	21,984	31,884
Net Electrical Output, TWh	31.7	28.2	29.3	31.1	31.8	31.9	33.2	36.4	36.4	39.0	46.9	51.1	51.1	51.2	53.5	62.5	78.0	80.9	94.8	134.1
Plant Utilization Factor, %	56%	49%	51%	53%	53%	53%	51%	49%	49%	46%	50%	49%	49%	50%	49%	48%	49%	48%	49%	48%
Average Tariff, Rs/kWh	1.06	1.41	1.46	1.56	2.34	2.61	3.13	3.42	4.01	4.58	4.57	4.78	5.39	6.07	6.86	7.03	6.54	7.19	11.17	8.18
Income Statement																				
Sales Revenue	33	40	43	48	74	83	104	125	146	178	214	244	275	311	367	439	510	582	1,059	1,098
Operating Cost*	20	26	27	32	34	36	39	42	45	56	67	72	75	81	93	119	141	149	279	392
Operating Profit	14	14	16	16	40	47	64	83	101	122	147	172	200	230	274	320	369	433	780	706
Net Profit	8	10	12	7	27	25	28	33	36	41	49	57	69	81	102	118	135	158	341	677
Balance Sheet																				
Net Fixed Assets in Operatio	127	187	216	229	217	214	312	297	366	745	788	755	723	829	1,344	1,992	2,026	1,953	6,091	5,019
Work-in-progress	60	65	52	52	133	259	302	456	541	329	464	679	913	1,032	874	622	1,009	1,694	8	8
Other non-current assets	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	3
Long-term Liabilities	61	66	78	96	162	274	403	528	667	813	940	1,071	1,215	1,374	1,629	1,926	2,210	2,626	3,965	2,542
Net Working Capital	20	30	17	25	46	57	69	90	112	134	134	141	153	169	172	194	193	156	325	2,597
Financial Ratios																				
Operating Margin	41%	35%	37%	33%	54%	57%	62%	66%	69%	69%	69%	71%	73%	74%	75%	73%	72%	74%	74%	64%
Net Margin	25%	25%	28%	13%	37%	30%	27%	26%	25%	23%	23%	23%	25%	26%	28%	27%	27%	27%	32%	62%
Current Ratio	1.37	1.40	1.65	2.66	4.41	5.59	6.30	6.31	7.34	6.33	3.70	3.71	3.65	3.78	3.67	3.86	2.74	2.26	1.95	6.90
Interest Coverage	2.74	3.45	4.26	1.70	2.88	2.06	1.81	1.73	1.67	1.63	1.62	1.63	1.67	1.71	1.78	1.82	1.86	1.91	2.30	4.15
Debt Service Cover	1.17	1.38	0.93	1.06	2.06	1.67	1.61	1.57	1.47	1.47	1.39	1.21	1.26	1.28	1.36	1.41	1.46	1.34	1.22	1.50
Debt Service Cover-Adj.		1.58	1.02	1.22	2.17	1.74	1.66	1.60	1.50	1.49	1.41	1.22	1.27	1.29	1.37	1.42	1.47	1.35	1.22	1.50
Return on Rate Base	9%	9%	9%	8%	16%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	13%	14%	20%
Return on Rate Base - Adj.	11%	10%	10%	9%	17%	15%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	20%
Return on Equity	3%	6%	6%	3%	12%	10%	11%	11%	11%	11%	12%	12%	13%	13%	15%	14%	14%	14%	15%	14%

Table 6.25: Past and Future Finances of WAPDA Hydel Under Scenario D (Scenario C Minus DHP)

	FY11	*FY12*	*FY13*	*FY14*	*FY15*	*FY16*	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*	*FY22*	*FY23*	*FY24*	*FY25*	*FY26*	*FY27*	*FY28*	*FY33*	*FY38*
	Actual			**Projected**																
Capacity, MW	6,516	6,516	6,612	6,751	6,903	6,903	7,359	8,502	8,502	9,624	9,624	9,624	9,624	9,624	10,364	12,614	14,864	14,864	17,664	27,564
Net Electrical Output, TWh	31.7	28.2	29.3	31.1	31.8	31.9	33.2	36.4	36.4	39.0	38.9	38.9	38.9	39.0	41.3	50.3	59.3	59.5	73.4	112.7
Plant Utilization Factor, %	56%	49%	51%	53%	53%	53%	51%	49%	49%	46%	46%	46%	46%	46%	45%	46%	46%	46%	47%	47%
Average Tariff, Rs/kWh	1.06	1.41	1.46	1.56	2.23	2.28	2.55	2.59	2.87	3.08	3.68	4.35	5.05	5.85	6.77	6.88	6.89	8.03	13.04	8.90
Income Statement																				
Sales Revenue	33	40	43	48	71	73	85	94	105	120	143	169	196	228	280	346	409	477	957	1,003
Operating Cost*	20	26	27	32	34	36	39	42	45	48	50	51	53	59	70	94	110	115	241	353
Operating Profit	14	14	16	16	37	37	45	53	60	72	93	117	143	169	210	252	299	363	715	650
Net Profit	8	10	12	7	26	24	27	32	37	43	53	62	74	87	109	124	142	165	344	674
Balance Sheet																				
Net Fixed Assets in Operatio	127	187	216	229	217	214	312	297	366	348	330	312	293	414	943	1,506	1,454	1,401	5,641	4,672
Work-in-progress	60	65	52	52	92	145	103	160	161	271	464	656	847	926	731	539	1,009	1,694	8	8
Other non-current assets	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	3
Long-term Liabilities	61	66	78	96	127	176	231	269	329	398	525	653	785	934	1,182	1,470	1,758	2,203	3,767	2,443
Net Working Capital	20	30	17	25	50	70	92	122	151	172	180	198	231	270	294	338	352	330	643	2,907
Financial Ratios																				
Operating Margin	41%	35%	37%	33%	52%	51%	53%	56%	57%	60%	65%	70%	73%	74%	75%	73%	73%	76%	75%	65%
Net Margin	25%	25%	28%	13%	36%	32%	32%	34%	35%	36%	37%	37%	38%	38%	39%	36%	35%	35%	36%	67%
Current Ratio	1.37	1.40	1.65	2.66	4.77	6.66	8.05	8.23	9.83	8.28	8.64	9.19	10.67	11.56	11.58	12.23	5.91	5.30	3.32	8.03
Interest Coverage	2.74	3.45	4.26	1.70	3.02	2.30	2.11	2.07	2.05	2.00	1.96	1.92	1.93	1.96	2.02	2.03	2.05	2.07	2.38	4.25
Debt Service Cover	1.17	1.38	0.93	1.06	2.08	1.74	1.78	1.77	1.65	1.67	1.55	1.59	1.64	1.70	1.78	1.80	1.83	1.57	1.34	1.56
Debt Service Cover-Adj.		1.58	1.02	1.22	2.21	1.83	1.85	1.82	1.69	1.70	1.58	1.61	1.66	1.72	1.79	1.81	1.84	1.58	1.35	1.56
Return on Asset Base	9%	9%	9%	8%	16%	15%	15%	16%	16%	16%	16%	16%	16%	16%	16%	15%	15%	14%	14%	21%
Return on Asset Base - Adj.	11%	10%	10%	9%	17%	16%	16%	16%	16%	17%	17%	16%	16%	16%	16%	15%	15%	14%	14%	21%
Return on Equity	3%	6%	6%	3%	12%	10%	11%	11%	11%	12%	13%	13%	13%	14%	15%	15%	14%	14%	15%	14%

Annex 7: Social Resettlement Management Plan
Dasu Hydropower Stage I Project (DHP-I)

1. **Social planning.** WAPDA has carried out extensive field surveys and public consultations to assess possible social impacts under the proposed project and develop their mitigation measures. These include the socioeconomic baseline survey, census of the affected population, inventory survey of asset losses, gender impact assessment, public health impact assessment and downstream fishery impact assessment. These cover both adverse and positive impacts of the project, including land acquisition, involuntary resettlement, gender, conflicts, public health, fishery, public consultation and participation, communication as well as promotion of local development. A set of social development interventions has been developed to address the identified adverse impacts and promote local area development.

2. **Socioeconomic profile of the project area**. The Project is located in the District of Upper Kohistan in Khyber Pakhtunkhwa (KPK) Province. Upper Kohistan is a mountainous district with Dasu Town as its district headquarters. The district is sparsely populated with only 63 persons per sq. km. People in the project area are divided along ethnic, religious and tribal lines. There are several main tribes with numerous sub-tribes in the area. Each tribe is headed by a *malik* (head), who occupy the predominant position within Kohistan society and ultimate authority within their own tribes. The *maliks*, *ulemas* (religious leaders) and tribal elders are members of the local *jirga*, which is the main forum for collective decision-making for all matters in Kohistan. Kohistan has a highly patriarchal society and polygamy is the norm in Kohistani society. *Purdah* (segregation of men and women, keeping women out of men's gaze) is strictly observed and women are almost absent in public life.

3. The 1998 Census placed Kohistan bottom in the country in terms of socioeconomic development indicators. Both literacy and school enrolment rates are among the lowest in the country. The main sources of livelihood are livestock, terraced agriculture and collection of non-timber forest products. Seasonal migration is very common in the project area. In winter people live near the river in their more permanent 'winter residences below 1,500 meters. Two agricultural crops are possible at this height but there is little suitable land available for farming. So farmers cultivate the higher level land (2,000- 2,500m) with only one crop annually. Here they build their "summer residence". The pastoralists herd their livestock in summer at higher altitudes (2,500- 3,000m), coming down with their livestock in winter time. Female labor force participation is less than one percent, but they are heavily engaged in activities such as terrace agriculture, growing vegetables for household consumption, rearing of poultry birds, and collection of firewood for cooking and warmth. There is no land records system but tribal demarcation of territory is very distinct and people know each other's territories very well.

4. **Social impacts.** Various field surveys have been carried out to assess project impacts. Major adverse impacts under the project are related to land acquisition and involuntary resettlement for various components of the project, such as the construction of the dam, its ancillary structures, formation of reservoir and relocation of Karakoram Highway. A total of 4,643 ha of land will need to be acquired, most of which are barren land and about 600 ha of which are agricultural lands, consisting of farm land, grazing areas and orchards. A total of 945 houses and residential structures, 197 shops, 31 mosques/prayer places, seven schools, two basic health units, three community centers and 17 graveyards will need to be relocated, requiring the relocation of 6,953 persons from 767 households. Other key potential social impacts are related to gender, public health and safety issues during construction, downstream fishery, possible conflict between local communities and the influx of construction workers, and increased pressure on local services and supplies. On the positive side, the project is expected to contribute significantly to the socioeconomic development in the local areas. Local population is expected to benefit from employment opportunities during the project construction phase as well as improvement of local infrastructure, public services and livelihood development support. Land required for various components of the project is listed in the table below.

5. **Livelihood impact assessment and project assistance approach.** A detailed analysis was conducted over the livelihood impact for the affected households in and around and the reservoir area, which is the major impact zone under the project. The analysis looked at general economic patterns

and activities, the physical spread of household economic activities at different elevations and during different seasons, income sources and their contributions to the household income, and the project impacts of land-taking upon their income levels. The analysis shows that the project would have limited impact on household income due to the anticipated land loss, averaging about 5% of household income. There are three key factors. One is the spread of economic activities across the slope, with more livestock and terraced farming and nearly all non-timber forestry project collection activities at higher elevations above the inundation zone. Two is that most of the lands to be lost are unproductive barren lands and three is the major role of livestock in household income generation. However, despite the averaged low income impact, the impact would vary across the households and those losing their terraced lands in the valley would need more attention and assistance to offset this impact.

6. On the basis of the analysis and in view of the lagging development status in the project area, the project has adopted an assistance strategy not only to mitigate the adverse project impacts but also help develop and improve livelihoods of the project-affected communities and support local area development. A two-prong approach has been designed to achieve this target. One is to assist the project-affected households and communities to use their land compensation money productively and invest them into new income generation activities. A livelihood support program is designed following this assistance strategy. Two is to support and promote local area development through improvement in basic infrastructure, such as transport, water supply and sanitation, public services in education, health, vocational training, livestock and agricultural extension services. These will be implemented under separate programs budgeted under the project.

7. **Mitigation and development interventions.** Along the above strategy, WAPDA has developed a series of interventions on the basis of field surveys and extensive consultations with local communities. These interventions are packaged into a Social Resettlement Management Plan (SRMP) that includes the following,

- Vol.1 Executive Summary (of SRMP)
- Vol. 2 Socioeconomic Baseline and Impact Assessments
- Vol. 3 Public Consultation and Participation Plan
- Vol. 4 Resettlement Framework
- Vol. 5 Resettlement Action Plan
- Vol. 6 Gender Action Plan
- Vol. 7 Public Health Action Plan
- Vol. 8 Management Plan of Construction-related Impacts
- Vol. 9 Grievances Redress Plan
- Vol. 10 Communications Strategy
- Vol. 11 Socioeconomic Baseline of Downstream Fishing Communities
- Vol. 12 Area Development And Community Support Program
- Vol. 13 Costs and Budgetary Plan
- Vol. 14 SRMP Implementation and Monitoring Plan

a. *Resettlement.* The project will require the relocation of 6,953 people in 767 households. Various potential options have been explored for their resettlement, including group resettlement within the river valley, self-resettlement outside the project area, individual household resettlement within the project area and group resettlement within existing community land at higher elevation. Consultations were carried out with the affected communities regarding these potential options and their preferences. The majority of the affected households prefer to move with their own tribal groups and build their new houses at a higher elevation within their existing communal territory. Assessment of these options led to the adoption of a multi-option approach for resettlement under DHP. Moving up to higher elevation within their existing territory is the approach preferred by the majority of the relocating households. The project design team and the communities followed up on this preference and identified 27 potential resettlement sites. WAPDA design team conducted preliminary assessment of these sites for their technical feasibility and carrying-capacity for resettlement, and prepared preliminary plans for the site development. These resettlement sites will be further assessed and designed in detail for their development. Some households have opted for self-relocation outside the project area. These

individual options will be examined in detail for their feasibility and implementation. The project team will continue to work with the relocating groups and households over their relocation plan, including other possible resettlement options.

b. *Livelihood development.* Given the relatively limited impacts, the target is therefore proposed not only to restore, but also to improve the livelihoods of the project affected population. The development approach consists of short term interventions for income restoration and a ten-year support program for sustainable livelihood development. The short-term interventions will start early prior to civil works, focusing on the affected households, assisting them in investing their land compensation money into household-based income generation schemes. NGOs experienced in rural development will be engaged to mobilize the communities and assist individual households to design and implement household income-generation schemes. WAPDA will design and implement a parallel support program to facilitate household-level income generation activities, including provision of vocational training and extension services, strengthening local government support systems. The project will establish a Social Development Fund to continue and expand the short-term interventions beyond the project construction period and the directly affected households. This will cover mainly the post-construction period and will continue for about 10 years. This program will be fully developed during the course of project implementation.

c. *Gender assessment and interventions.* A gender assessment was conducted to inform the project design. The assessment reveals a much lacking status of women in the project areas, urgent need for development assistance and yet an extremely challenging environment to introduce and implement development interventions specifically for women. Women are completely absent from public life in the district. They don't work outside their homes and don't participate in politics or public life. Sometimes they do work in field near their homes but along their male relatives. Access to education is quite limited for women. There is strong resistance to efforts to promote the empowerment and uplift of women in the project area. Even women heath workers cannot visit women in their homes. These constraining factors could not be ignored or circumvented. Nevertheless the project will try and find its ways to introduce and implement necessary interventions even in this constraining environment.

d. Based on the gender assessment, the project has proposed a three-prong approach. The first is to educate project staff, including construction forces to raise awareness and increase sensitivity on gender. The second is to educate men, such as local leaders, religious leaders and husbands on the importance for women to access project benefits, creating conducive environment for women to participate in and benefit from the project. The third is to identify existing and future entry points and use them as much as possible to benefit women. It is also cautioned that, given the sensitivity, all interventions related to women will need to be discussed and agreed with the communities first before putting to implementation Key interventions include:

- Conduct regular meetings and workshops involving tribal leaders, *maliks*, *ulemas* and other local stakeholders to raise awareness about women rights, importance and the need for women to benefit from the project through participation in various income generation, education and health initiatives.
- Gender sensitization and capacity building training for project staff, local government officials and other stakeholders to consider and address gender concerns.
- Dissemination of project information and its benefits in the project area, particularly women, children, youth and the elders.
- Ensure that women, children and the elderly are the primary beneficiaries of the health and education programs.
- Ensure that livelihood development activities maximize the existing "entry points" where women are already engaged in "home-based" income generating activities and support them with skill training, micro-credit and other means feasible.
- Build in as much as possible socio-psychological support and counseling to women during relocation and resettlement and adjustment in new resettlement sites.

e. *Management of Construction-related Impacts*. The construction of the project will bring in a large influx of "migrant population" into Upper Kohistan District, Dasu Town in particular. This includes the construction workers, project management staff, service-providing followers and employment seekers. This may give cause to conflicts over resources, differing cultural conducts and behavior, public health, safety and security issues. WAPDA has developed a management framework to proactively address these types of issues during the project construction. Interventions include awareness raising among local administration and communities over the in-migrants, contractors' proactive planning about the management of their work forces, including their health plans and code of conduct, strengthening of local institutions to manage conflict and security issues etc.

f. *Public health action plan*. The plan is developed on the basis of an assessment of possible project public health impacts, local public health services capacity and gaps to provide the services required under the project. The plan aims to minimise risks and address possible harmful effects on public health under the project. It will focus on i) dealing with public health issues among the affected population in relocation during the pre-construction period, ii) measures to minimise and address adverse effects on the health of migrant, resident population and the construction workforce during the construction phase and iii) measures to promote future health benefits immediately after completion of the project. Interventions include establishing health baselines, information, education and communication programs, preventive, curative and promotive health activities, monitoring, diagnosis and treatment of specific diseases, emergency response actions and support to strengthen local medical institutions. This program will require the coordination among WAPDA Dasu Project Office, Upper Kohistan District Health Office and the construction contractors for its detailed programming and implementation. WAPDA will be the leading agency for coordination and implementation of the program. The estimated budget for the Public Health Action Plan for a 12-year period is US$15.09 million

g. *Approach to address downstream fishery impacts*. A study was carried out to evaluate potential impacts on fishing communities downstream of Dasu Dam. The study covered four districts over 200 km stretch between the proposed Dasu Dam and Tarbela Reservoir. The study established baseline conditions of the fishing communities, reviewed their present fishery activities, income levels and assessed possible impacts during and after project construction. The study indicates that the development of Dasu Hydropower Project will have some but relatively small impacts on fishery activities downstream as most of the fishery activities occur along the tributaries rather than the main stem of Indus River. The recommended measures include maintaining tentative minimum flow for the low flow season, development of community based natural ponds/raceways along the river or tributaries and establishment of local scale fish hatcheries and training programs.

h. *Local area development support.* . In addition to impact mitigation and improving livelihoods of the affected communities, the project has proposed to set up an Area Development Fund of $30 million to support local area development in Upper Kohistan District. Possible interventions could include improvement and expansion of education and health facilities, road and communication infrastructure, provision of vocational training and livelihood extension services, and improvement and upgrading of infrastructure facilities in Dasu Town and strengthening of local institutions to provide long-term support. The management and operation of the fund will be designed in detail during the initial phase of the Dasu Hyropower Project. This will be completed in partnership with Upper Kohistan District Administration and local communities. Following a major study on benefit-sharing in energy sector in Pakistan, the government will carry out further consultations with stakeholders in country, including relevant federal agencies and provincial governments and explore the possibility of piloting some benefit-sharing initiatives under DHP.

8. **Public consultation and participation.** The Public Consultation and Participation Plan (PCPP) presents consultations carried out during the planning phase of the project and its strategy as well as plan for consultation during the project implementation. The stakeholder analysis carried out identified the primary and secondary stakeholders, analyzed their respective views, expectations, roles and responsibilities regarding the Dasu Hydropower Project. Local consultations and *jirga* (assembly

of elders) meetings were conducted before the starting of the field surveys of the project design work to share preliminary project design information and seeking views and recommendations from local communities. The project preparation and design followed a participatory approach where local communities were closely and extensively engaged in the formulation of the project social and environmental action plans. These are detailed in the PCPP. Four national workshops were held in Peshawar, Lahore, Karachi and Islamabad at the early stage of the project impact assessments to share preliminary project information and seek public feedback. Three national workshops were held at the completion of the draft environmental and social plans to disseminate the drafted plans for further feedback, including one held in Upper Kohistan District. This participatory process will continue through the design and implementation of the various social action plans where the affected population will drive the formulation and implementation of the resettlement program, the livelihood development program. Similarly, the public health program and area development support program will be designed and implemented jointly with land communities. The project will set up Public Information Centres (PICs) in WAPDA Head Office, Dasu Town and the project areas for disclosure of Environmental Management Action Plan (EMAP) and Social and Resettlement Management Plan (SRMP). WAPDA will recruit consultation and communication specialists to take charge of public consultation and communication work under the project.

9. **Communication strategy.** A strategy is developed to guide communications with stakeholders during the project implementation to timely disseminate information among key stakeholders, enhance transparency, promote and increase participation of stakeholders in decision-making. The strategy focuses on ensuring internal communications among staffs of the project and relevant government institutions, timely provision of project implementation information to stakeholders, re-enforcing project participation and grievance redress mechanisms, carrying out a phased multi-media communications programme and strengthening communication capacity of WAPDA and Dasu Project Office. The Dasu Project Office will coordinate the implementation of this strategy through a communications unit at head-office level and another unit at the project-site. These units will be staffed with communications experts.

10. **Grievance Redressal Mechanism.** A grievance redress mechanism will be established under the project to hear and address any grievances from the affected families and communities. This will be a four-tier "bottom up" system of grievance redress committees (GRC), including (i) Village Level GRC, (ii) Union Council Level GRC, (iii) District-Level GRC and iv) Project Level Independent GRC. The GRC members will consist of representatives of the affected communities to be selected through Jirgur meetings, project staff and local government representatives. Local communities will participate at each level to ensure their voices are heard and considered in the decision-making. The Project Level GRC will be chaired by a retired civil judge to be competitively recruited. This is to introduce elements of neutrality in the system. A separate grievance redress cell will be established under the Deputy Project Director. The composition, responsibilities and operating mechanisms the GRCs at each level are described in detailed in the Grievance Redress Plan of the SRMP. The plan also describes the GRC procedures and timeline, covering filing of cases, review and hearing, records and documentation, and notification of outcomes. The final GRC mechanisms as approved for this Project will be disclosed to the affected persons prior to Project approval. All documents related to GR cases will be maintained in the Deputy Director Office for review or verification by WAPDA. The project has budged to cover the operation cost of the GRC, including office facilities, honorarium, travel and other costs for the GRC members. The operation of this grievance redress system will be reviewed and evaluated regularly by the independent monitor. Annual evaluation of GRC activities will be conducted and its result posted in the Project website. The project will also organize orientation and training to GRC members prior to commencement of their work. The training should be provided by competent technical experts in social/resettlement and environmental management.

11. **Implementation and monitoring arrangements.** WAPDA has proposed an institutional setup for the implementation of the Dasu Hydropower Project. The General Manager/Project Director of DHP will be the executive head of the entire Dasu Project operations. A project advisory committee will be established at the site to review, discuss and advise on project policy and implementation matters. It will consist of the Project Director, Deputy District Officer and

representative of local communities. A layered institutional setup will be put in place to implement various social programs. They consist of the following,

a. WAPDA Dasu Social Team. One Deputy Project Director will be appointed with the sole responsibility for the implementation of the social environmental plans. S/he will be supported by a social team of experienced staff. The social team will be organized into several groups, equipped with expertise and experiences required to implement various social action plans on resettlement, gender, consultation participation, grievances redress, public health etc.
b. Dasu Implementation TA team. A team of international and national experts will be recruited under the TA. This team will work alongside the Dasu Social Team.
c. Upper Kohistan District Team. This team will be mobilized from various relevant agencies of Kohistan Division and District. They will work together with WAPDA Dasu Social Team.
d. Implementation support NGOs. NGOs, experienced in rural development and with operational experiences in Upper Kohistan District, will be engaged to facilitate and implement livelihood and public health programs. They will be working directly with communities as the implementing arm of the project.
e. Independent monitors. A qualified institution, independent of WAPDA. will be recruited to carry out independent monitoring of the various social programs. Its qualification, scope of assignment and reporting requirements are detailed in the SRMP.

12. **Dasu Transmission Line**. A transmission line is proposed to be constructed to evacuate power from Dasu Hydropower Plant. The NTDC is responsible for the planning and construction of the Dasu Transmission Line. A general corridor has been selected and the alignment is still under study and yet to be finalized. NTDC has conducted a socioeconomic survey within the alternative corridors to establish the socioeconomic baseline. The survey team conducted initial rounds of consultations in the project districts and carried out screening of possible project impacts. The survey indicates that the transmission line will require land acquisition for the tower posts and may cause damages to crops and orchards, and disruption of local access routes. It will impose restrictions on the land use within the transmission line corridor and affect the land use by the land owers. NTDC, with support from ADB, has developed a Land Acquisition Resettlement Framework (LARF) following relevant government and ADB policies. The LARF has been reviewed and cleared by ADB for compliance with its resettlement policy. The LARF has been adopted by NTDC for all its investments with support from international financial institutions. It has also been reviewed and approved by the World Bank for compliance of OP 4.12 under CASA 1000 Project. This LARF will apply to Dasu Transmission Line. Once the transmission line corridor is finalized, resettlement action plans will be prepared in line with the LARF. The Environment Social Impact Cell of NTDC will be directly responsible for the planning and implementation of the resettlement action plans.

Land Tenure and Requirement for the Project

13. Given the scarcity of flat land in the project areas and the remaining land resources available to the affected households, the land-for-land option is not considered appropriate. Instead, the project has proposed a two-prong approach for resettlement and livelihood development. This consists of cash compensation for lands and long-term technical assistance to affected households and communities to invest their cash compensation money into alternative income-generation activities. A resettlement action plan has been developed following this approach.

14. **Land Tenure in Upper Kohistan.** Traditionally, tribes own the lands within their tribal territory. Land was allotted to individual households or sub-tribes for use and the tribes used to rotate their lands every five to ten years. After the1960s, the tribes decided to allot the lands on a permanent basis. At present all the lands are divided among the tribes and most of the lands are allocated to individual households or sub-tribes. However, there is no formal system of land tenure in the entire District of Upper Kohistan. Land titles or records as expected under modern land management systems do not exist in Upper Kohistan District. Nevertheless, the tribes and their member households have maintained a traditional informal record system, and they know their land property boundaries. Land disputes are resolved through Jirga, a committee of elders representing all parties to a problem and are constituted at different levels depending on the need. The Jirga is the traditional

system among the tribes for local decision-making, resolving disputes and grievances related to land ownership.

15. Upper Kohistan District was under the Provincially Administrated Tribal Areas (PATA) in KPK Province. It became a District under the federal administrative system in 1976. Practises of the local traditional governance system are still accepted by the provincial government and district administration in conjunction with the law of the country. The district administration involves the *maliks* and conducts J*irga* system for local decision-making and resolution of disputes or for project administration.

16. **Land requirement under the project.** Extensive field surveys and local consultations were carried out for the resettlement planning, including household loss inventory surveys. The lands are of various categories, including terraced farmland, grazing areas and barren lands, which accounts for a substantial amount of the lands to be acquired. It is also expected that a large portion of the lands would be communal lands. Given the absence of a formal land record system, the ownership of individual land plots within the identified areas of acquisition will be further verified and confirmed by District Administration jointly with concerned households and community Jirga for compensation payment. This is a lengthy process and will start soon. Given the low population density in Upper Kohistan District, the average land loss per household is much larger and therefore the averaged compensation amount at household level is also expected to be higher.

Table Land Acquisition Requirements by Components

Component	Land Acquisition Requirement (ha)	Land Acquisition Requirement (%)
Reservoir Area	4,006	86.28
Dam and Powerhouse Plant Area	269	5.79
KKH Relocation:	42	0.9
Other Roads	157	3.38
Colony, Office and Construction Camps	102	2.19
Other Uses (Fish Hatchery, Archaeological Sites etc. and Resettlement Sites	67	1.44
Total	**4,643**	**100**

17. **Land Acquisition and Valuation.** The Land Acquisition Act (LAA) 1894 enables the government to acquire lands for public purposes and regulates the land acquisition process. The District Deputy Commissioner (DDC) will represent the state as mandated and authorized under the LAA 1894 to carry out the land acquisition process. The DDC will follow the specified acquisition steps as laid out clearly in the LAA from initial announcement of intent to delivering compensation money. The LAA requires compensation to be paid for legally owned land at market value as averaged among recorded transactions in the past year. The DDC is authorized to convene a committee to carry out this evaluation, announce and award the compensation payment. The LAA also provides for objections to be raised, heard and addressed over the compensation rates.

18. The LAA applies to Upper Kohistan District, but its application has factored in local characteristics in its standard acquisition process. The first factor is the land ownership registration and titling status under the traditional land system. LAA mandates payment against registered titles. Proof of land ownership is required to be eligible for compensation and it is the responsibility of the land owner. In the absence of a land title and registration system in Upper Kohistan District, an important extra step is to complete registration and titling before award of compensation. The normal practice is that, with the field demarcation of the area to be acquired, the concerned communities, together with district revenue and land acquisition officers, will determine and develop a list of titled households and communities. This is often done through field visits, Jirga meetings and final verification by district officers. The result is recorded on cadastral maps and submitted with a registration report for compensation. This seems to be a common practice in tribal areas in KPK Province and FATA Area. The second factor is the land compensation rate evaluation process. Normally the DDC convenes a price assessment committee of heads of relevant district departments, deliberates and determines the rates using the LAA formula. The committee could also include community representatives or concerned households. The DDC announces and awards the rates if

there are no objections. Sometimes, particularly with large scale acquisition, the offered rates were further discussed, negotiated and agreed with the communities through Jirga meetings. The negotiation part is important considering the limited market transactions, absence of transaction record and the traditional governance system and practice in these areas. These practices in tribal areas have been reviewed and accepted in World Bank operations.[35]

19. Land transactions are few in the project areas, with limited registration that can provide a basis for estimation and rate assessment. The project team held initial discussions with local communities and Upper Kohistan District Administration over this issue. Based on the consultation feedback and assessment of the land market situation in the project areas, it was determined that the recent hydropower projects in Upper Kohistan provide the best reference for estimating compensation budget for land for Dasu Hydropower Project. The most recent case is Keyal Khawr Hydropower Project (KKHP) whose land compensation award was made in 2011. Its compensation rates were adopted from Diamer-Basha Hydropower Project (DBHP[36]) land compensation rates that were notified in 2008 and then approved by the Economic Coordination Committee (ECC) of the Cabinet in June 2010. Both are domestic projects. ADB is interested in supporting DBHP and provided technical advice in the resettlement program, which has been under implementation. The DBHP rate evaluation went through a consultative and negotiation process, starting from initial market rate assessment for land of different categories and qualities, followed by assessment by the district committee, Jirga meeting and feedback, then negotiation by the regional administration in 2009 and then revised rates recommended by a ministerial level committee organized by the Prime Minister's Office with final approval of these rates by the ECC. KKHP project is smaller project, its rates were derived from the DBHP rates and they were accepted by the communities. For comparison these rates are tabulated below.

20. In view of the above, the rates from both projects were considered the best reference both in terms of market value and people's expectations. The KKHP rates were updated by including annual escalations. These rates are used for costing purpose to estimate the cost of land acquisition under the SRMP. At the same time, the consultation and negotiation process is continuing. These rates are being offered to local communities at *Jirgas* for their feedback and endorsement. The final negotiated and agreed rates between local communities and the DDC will be used to finalize and deliver the final compensation payment. This represent best the replacement cost as required in OP 4.12.

21. **Benchmarks and Comparison with Other Projects.** Overall land is expensive Pakistan relative to other countries, because of availability of cash at the local level and few investment opportunities, no taxation in the agriculture income etc. Household survey data indicate that land in KPK province is 150% more highly valued than the national average. In mountainous area, like Kohistan where flat land is short and access to the region is limited only through Karakoram Highway, land in general is more costly. Also the prices would be different in case of involuntary and voluntary sales.

22. The team has compared the land costs per hectare with the 18 greenfield hydro projects that the Bank has financed since FY02. Land values vary tremendously across projects and even within a projectAgricultural land is not always more or less valuable than residential land. For example, in Rusumo Falls (FY 14), residential and commercial land -- $7,000/ ha (Rusumo Village, Tanzania) and $83,921/ha (Rusumo East, Rwanda). Vishnugad Pipalkoti (FY11) Non-irrigated land -- between $8,800/ha and $161,010/ha, depending on the community.

23. **Delivery of Compensation.** The compensation rates would be approved by the Ministry of Water and Power and the Ministry of Finance. They would be publically announced along with the process to establish such rates. The Project will deliver the compensation package to the PAPs and communities through the DDC. The Project will deliver the compensation package to the PAPs and

[35] KP Emergency Road Recovery Project, KP Emergency Road Recovery Additional Financing II; FATA Emergency Rural Roads Project.

[36] DBHP is 80 km upstream of Dasu Dam. Local communities did not accept the rates as assessed and offered by the District Price Assessment Committee. As directed by the Prime Minister's Office, a ministerial committee was set up in December 2009, to review the offered and requested rates from local communities. The committee recommended rates were accepted by the communities and adopted for compensation payment under DBHP.

communities through the DDC. The Project Office is planning to open individual bank accounts for all eligible PAPs and communities. Compensation package will be announced and notified to each entitled family and communities. Compensation payment will be made in installments through direct deposit into individual accounts. The payment will be scheduled along resettlement implementation progress.

24. The project would have a rigorous monitoring system to check this process of valuation of the land and other properties as well as the implementation of the resettlement plan and livelihood development. The implementation of the SRMP would be monitored and audited by an independent monitoring consultant (component F2), in addition to the internal monitoring by Dasu Project Director's office. The project audit will also include auditing of these transactions. Large transactions, over US$50,000 per transaction, would be subject to prior review by the World Bank and the remaining audited subsequently. Also, the World Bank would have experienced staff experts from its headquarters and Islamabad Office (supported by experienced STCs) to monitor the valuation and payment process as well as the entire SRMP implementation under this project. The project will also establish a four-tiered grievance redress system that will cover the entire process of rate evaluation and compensation payment.

25. **SRMP Cost.** The total cost of SRMP is estimated at US$325.11 million, see table below. Physical contingencies of 25% and 8% or price contingencies are assumed –since the estimates are still preliminary and historically significant cost overruns have been observed. On the basis of this and advice from experts, higher levels of physical contingencies have been assumed. The cost of compensation for land and property and allowances is about US$180.2 million. Out of the first IDA credit about US$75 million are proposed to be used for land compensation and US$36 million for compensation of other properties, rehabilitation and assistance etc. The total IDA funds proposed to be used for SRMP are US$201.5 million. A large amount IDA allocation would be kept in unallocated category to allow batter monitoring of these expenditures.

Table: Details of Social and Resettlement Management Plan cost and IDA allocation (US$ millions)

	Base Cost	Total with Cont.	IDA	WAPDA
1.1 Land compensation	180.2	243.3	75.0	168.3
1.2 Structures, trees, crops, other assistance	31.7	42.8	30.0	12.8
1.3 Livelihood Support	15.8	21.3	6.0	15.3
Sub-total	227.7	307.4	111.0	196.4
2. Resettlement sites development, local area deveopment	46.7	63.0	45.5	17.5
3. Implememntation, manage, monitoring, training, capacity building etc.	23.2	31.3	20.0	11.3
4. Other programs, public health, gender,	27.6	37.2	25.0	12.2
Total	325.1	438.9	201.5	237.4

Annex 8: Summary of Environmental Assessment and Environmental Management Plan
Dasu Hydropower Stage I Project (DHP-I)

1. **Proposed Project:** The Project location, components, and structure have been described in the Annex 2 of the PAD and also provided fully in the Environmental and Social Assessment Report.

The Environmental and Social Assessment

2. The Environmental and Social Assessment (ESA) carried out for the project covers the baseline, expected impacts and necessary mitigation and management measures in an integrated fashion for almost all aspects of the dam and its ancillary facilities, including also the relocation of the 52km stretch of the Karakorum Highway (KKH) which will be submerged by the reservoir. The only project component which is not covered is the future 500 kV transmission line which will be required to evacuate power from the project to Islamabad, given that the planning and design of the alignment and towers have not been finalized yet. Therefore, for the transmission line component, a stand-alone Environmental Assessment and Review Framework (EARF) has been prepared, which provides an overview of baseline conditions within a 500m wide swath of land within which the final alignment is likely to be chosen, as well as guidance on the process and contents for carrying out a full detailed ESIA for this component at the time that its detailed design is undertaken.

3. **Studies and basic data:** The Environmental and Social Assessment (ESA) is primarily based on field studies and data collection done by the consultants (DHC) charged with the design of the project. During the review of the environmental and social reports (May 2012 – November 2013) the independent consultants developed a common approach with DHC in estimating and interpreting the potential impacts of the project and their possible mitigations.

4. **Compliance Status with Country Legislation and World Bank Policies:** The present compliance status of the project with Pakistani legislation and World Bank safeguard policies is indicated in the Table 8.1.

Table 8.1: Compliance with Government of Pakistan Legislation and WB Safeguard Policies

	Legislation/Policy	Actions Taken to Comply
GoP	Pakistan Environmental Protection Act, 1997	WAPDA received a No Objection Certificate for the project from KP-EPA on 23 November 2011 based on the EIA prepared during the feasibility studies. No further approval is required from KP-EPA. Nonetheless, WAPDA submitted the ESA reports to KP-EPA in December 2013.
	EIA Guidelines for Power Projects	The updated ESA is prepared and will be submitted to KP-EPA for review.
	International treaties	Verification of protected sites, Red List and protection of vulnerable habitats.
	Public information and disclosure	Public information centers will be established at Dasu on both river banks. The Executive Summary of the ESA and the Resettlement Action Plan (RAP) have been translated to Urdu and are available at the WAPDA office in Dasu, along with other project information. The draft ESA report has been disclosed on WAPDA's website. Final round of consultations has been held by DHP with the affected community and other stakeholders in Dasu, Islamabad and Peshawar.
World Bank	Early screening and Scoping	Scoping sessions were held through consultative workshops at Peshawar, Lahore, Karachi and Islamabad; and consultations at the affected villages.
	Participatory approach	Workshops, consultation meetings and focus group discussions were held.
	Integrate EA and SA	Natural environment, human health, social aspects, PCR are integrated in planning documents.
	Natural Habitats	Verification of protected sites and ecosystems, Red List and endangered flora and fauna has been done. Discussions with conservation agencies (WWF, IUCN) were held on possible compensation measures. Ecological flow requirements along the Indus basin were studied and used to

	Legislation/Policy	Actions Taken to Comply
		determine improved ecological flow commitments.
	Risk assessment	Health and safety risks for population and workers are identified in the ESA and will be included in an Occupational Health and Safety Plan; Environmental Code of Practices (ECP) – occupational health, labor – will be included in tender documents; an Emergency Response Plan will be prepared by the Contractor before commencing the construction activities; a Dam Safety Panel of international experts has been nominated for review of dam design and construction.
	Climate Change and floods	Impact of increased snow-melt and climate change and effect on Indus floods were studied. The dam is designed to withstand glacial lake outburst floods (GLOFs) as well as increased flow rates from climate change. The project will also support glacial monitoring efforts in the upper watershed
	Cumulative Impacts	Cumulative impact assessment has been conducted as part of the ESA to cover the (i) impacts of all existing and proposed development in Upper Indus Basin (Diamer-Basha, Tarbela and Dasu) and (ii) contribution of Dasu towards increments effects.
	Alternatives	Alternatives considered included: the "without project" case; alternative power supply sources; location of the project facilities, dam and water ways; dam type; power generation equipment and construction phasing.
	Pollution	Baseline survey of environmental quality has been carried out. Stricter environmental standards were applied and ECPs will be included in contract documents.
	Physical and Cultural Resources	Verification with Department of Archaeology implemented. Mitigation measures include salvage of the historic mosque located in the flooded zone, as well as protection and tourism promotion of rock art at Shatial. Chance find procedures will be included in contract documents and a project archeologist will be on stand-by.
	Gender	Gender consultations were carried out during ESA. A Gender Action Plan has been prepared.
	Public Health	A comprehensive study on public health aspects has been conducted and a Public Health Action Plan has been prepared
	Consultation and access to information	Consultations have been held in all the affected villages and with the *jirgas*, or committee of elders. Stakeholder workshops were conducted in Peshawar, Lahore, Karachi and Islamabad in 2012. The draft ESA and SRMP reports have been disclosed to the affected communities in public meetings in Dasu, Peshawar and Islamabad in February 2014. The Executive Summary report is translated in Urdu and is available through two Public Information Centers established at the project site. The reports (in English and Urdu) have also been made available in public libraries and were posted to WAPDA's website on 24 January 2014. The ESA, its Summary, and SRMP were also sent to the World Bank InfoShop and disclosed on 24 January 2014.

5. **Definition of impact area and zone of influence:** The impact area of DHP includes all permanent and temporary areas (the footprint) to be acquired for the reservoir and for construction works, housing areas, offices, camps and for realignment of KKH. Upstream of the dam the impact area also includes the left and right bank of the Indus, from the riverbed up to the full supply level of the reservoir at 950 m asl and higher to cover the resettlement areas up to 1500 m asl. At the right bank the impact area also extends to this elevation to cover the corridor (width 500 m) associated with the realignment of 62 km of the KKH. The direct impact area of the project along the Indus river extends towards a point about 10 km downstream of Dasu bridge. Here the direct influence of the tailrace tunnels of the project is estimated to end and the flow pattern in the river will be "normalized" under the planned base-load operations of the power plant. .Upstream from the dam the impact area extends towards the upper end of the reservoir, where the impacts of changes in hydrology and sedimentation begin. Also included in the direct impact area are the borrow areas needed for the project and the 45 km long corridor (width 100 m) in the Indus valley from Dubair Khwar to Dasu needed for the construction of a 132-kV transmission line to provide energy during the construction

stage. Also the 250 km long corridor for the main 500 kV transmission line between Dasu and Pathar Garh grid station in Punjab is included.

6. The area of influence: The area of influence of the project is much larger and is estimated to cover the Indus valley between Dasu and the Tarbela Reservoir (downstream of the dam there are no impacts expected from DHP). However, the project could seriously influence the traffic and transportation of people and goods on the KKH between Hassanabdal and Khunjerab pass (China border) and vice versa.

Project Alternatives

7. The project environmental assessment considered number of alternatives. These included: (i) without-project alternative; (ii) site selection of main structure and hydraulic and electrical infrastructure; (iii) alternatives for the type of structure - (a) Roller Compacted Concrete structure (RCC), (b) Concrete Faced Rock fill structure and (c) an Earth fill structure; (iv) alternatives for the lay-out of intake and tail race tunnels; (v) alternative sources of construction material; (vi) alternatives for the selection of generating equipment; (vii) alternative construction schedules; and (viii) alternatives for resettlement.

Potential Environmental Impacts, their Mitigation and Management

8. **Impact Assessment Methodology:** Potential environmental and social impacts were identified on basis of the earlier feasibility study (2009) and the focus group discussions and stakeholder consultation workshops which were held in Peshawar, Lahore, Karachi and Islamabad. The significance of potential impacts was assessed using the following criteria:

9. **Impact Magnitude:** The potential impacts of the project have been categorized as major, moderate, minor or negligible based on consideration of the parameters such as: i) duration of the impact; ii) spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria.

10. **Sensitivity of Receptor:** The sensitivity of a receptor has been determined based on review of the population (including proximity / numbers / vulnerability) and presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic.

11. **Assigning Significance:** Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor has been determined and the significance of each potential impact established using the impact significance matrix shown below in Table 8.2.

Table 8.2: Significance of Impact Criteria

Magnitude of Impact	Sensitivity of Receptors			
	Very high	High	Medium	Low / Minimal
Major	Critical	Major	Moderate	Minimal
Moderate	Major	Major	Moderate	Minimal
Minor	Moderate	Moderate	Low	Minimal
Minimal	Minimal	Minimal	Minimal	Minimal

Summary of Assessed Impacts

12. A summary of project's potential impacts and their significance is presented in the following Table 8.3

13. **Major Potential Impacts identified in EARF for Transmission line:** Potential impact of Transmission Line on Palas Valley: The EARF identified the crossing of the TL through Palas Valley as a potential environmental impact, to be studied in greater detail during ESA. The 500 kV transmission line will run over a distance of about 250 km and will begin at the Dasu Hydropower plant. The line will follow the Indus valley between Dasu and Pattan. From there, the corridor proceeds through the lower Palas valley and passes the districts of Battagram, Mansehra, Abbotabad, Haripur passing east of Tarbela Dam towards Pathar Garh, situated near Hasan Abdal in District Attock, Punjab. Out of total 250 km about 200 km is mountainous terrain with rocks, and covered with natural and planted forests. Only the last 50 km towards Pathar Gharh is relatively flat or slightly sloping terrain with cultivated lands and barren areas. The crossing through Palas valley could be environmentally sensitive, since this area is an IBA (Important Bird Area) declared by Bird Life International. Palas valley is also known by its rich biodiversity and is considered to be an environmental hotspot. In the EARF the NDTC has been recommended to consider various alternative routes for the TL. These alternatives should be covered under the ESA to be undertaken by NTDC later in 2014.

14. **Potential impacts of Transmission Line on bird migration along Indus Flyway:** The EARF prepared by consultants assigned by NTDC identified as another potential impact of the routing the interference of the selected TL- corridor with the well-known Indus Flyway, or Bird Migration route no 7 along the Indus. The Indus Flyway also follows the River Indus with its narrow valley and especially large flocks of waterfowl, geese and ducks, cranes and herons are passing there twice a year on their way from Siberia towards their wintering grounds situated in Sindh, Indus Delta and along the coastline of the Arabian Sea, and vice-versa.

15. **ESA Study:** The EARF also includes the ToRs of the detailed ESA to be carried out during the design of this component. There are potential alternatives available for alternate routing of the transmission line, which include complete bypassing of the Palas valley. The study will compare the various alternatives and assess their impacts on the biodiversity of the Palas valley. One important issue to note is that the Palas valley is not listed in some 150 long list of protected and conservation areas in Khyber Pakhtunkhwa, and hence there is no monetary support available from the government to strengthen the conservation measures in the Palas valley. The biodiversity in the Palas valley is currently under heavy stress from deforestation, firewood collection, overgrazing, over-hunting, over-harvesting of medicinal plants, soil erosion, use of pesticides, and weak law enforcement. Considering these issues, the ESA study will also assess the merits of passing the transmission line through Palas valley besides evaluating possible enhancement measures (e.g. through funding of conservation measures by the project). The study will also identify and evaluate various alternatives available during the design and construction phase of the transmission line including siting and design of towers, access paths, and construction methodology. The ESA will cover the potential impacts associated with the construction and operation of the transmission line and related ancillaries, as well as all temporary and permanent facilities and resources required (e.g., including access routes, helipads if required, workshops, and equipment yards) during the construction and operation phases. The ESA will also include an avian risk assessment, addressing the potential impacts of the transmission line on birds. The study will also cover the cumulative impacts of this components and any other project in the area. The ESA will also include environmental management and mitigation plans which will be embedded into the bidding documents for the construction of transmission line. World Bank will provide funding for detailed design and ESA study of the transmission line. The ESA will be reviewed and cleared by the Bank before any construction on this component can be commenced.

Table 8.3 Potential Impacts and their Significance

Impact	Phase	Sensitivity	Magnitude	Significance Prior to Mitigation	Mitigation and Enhancement Measure	Residual Significance
Environmental impacts due to project siting:						
Changes in physiography and landform	All phases	Mild	Major	Moderate adverse	• Development and implementation of a Landscape and Replanting Plan in the project footprint areas	Low adverse
Change in land use (3,900 ha) t	Pre-construction, Construction	Severe	Major	High adverse	• Compensation and assistance to affected households and communities according to eligibility matrix of RAP • Implementation of landscaping and plantation plan	Low to moderate adverse
Loss of natural vegetation and trees	Pre-construction, Construction	Mild	Medium	Moderate adverse	• Planting of native trees near resettlement villages and along roads • Promoting the use of alternatives to fuel wood • Afforestation and Forest Rejuvenation Plan	Low to Moderate Adverse
Inundation of 33 mosques in affected villages	Pre-construction, Construction	Severe	Medium	High adverse	• Disassembling and rebuilding of five wooden mosques in new resettlement villages at higher elevations, as discussed and agreed with the communities. • Replacement of remaining 28 mosques with the new ones in resettlement villages.	Minimal
Impact of increased traffic and transportation on KKH	All phases	Severe	Medium	High adverse	• Traffic Management Plan, including awareness raising and safety measures	Low to moderate adverse
Inundation of 52 km of KKH -	All phases	Very Severe	Major	Critical	• Realignment and construction of 62 km of new KKH at higher level	Minimal
Loss of bridges and access roads connecting villages on right bank	All phases	Severe	Major	High adverse	• Building of a new suspension bridges over the reservoir and construction of new access roads along the right bank	Minimal
Adverse impacts on natural habitat	All phases	Severe	Major	High adverse	• Study, selection and implementation of minimum two community-led conservation activities in the DHP sub-catchment areas • Supporting and promoting conservation activities in Kaigah game reserve • Compensation of community for any losses from sales of hunting permits during construction stage	Moderate to high adverse
Social impacts due to Project Siting:						
Change in land use (3,900 ha)	Pre-construction and construction	Severe	Major	High adverse	• Prepare and implement RAP; temporary lease of land needed for construction facilities	Low to moderate adverse
Resettlement of 767 households, totaling 6,953 people	Pre-construction and construction	Severe	Major	High adverse	• Compensation and assistance to affected households and communities according to eligibility matrix of Resettlement Action Plan	Moderate to high adverse

Impact	Phase	Sensitivity	Magnitude	Significance Prior to Mitigation	Mitigation and Enhancement Measure	Residual Significance
Relocation of shops/commercial establishments	Pre-construction, Construction	Mild	Medium	Moderate adverse	• Compensation for lost assets and commercial enterprises • Assistance and livelihood restoration of affected persons according to RAP	Low to moderate adverse
Loss of civic amenities	Pre-construction, Construction	Mild	Medium	Moderate adverse	• Rebuilding of civic amenities by project	Minimal
Loss of 143 ha agricultural land and 280 ha grazing land	Pre-construction, Construction	Severe	Medium	Moderate adverse	• Compensation for lost land, crops and fruit trees and livelihood assistance according to RAP • Implementation of Income and Livelihood Restoration Plan and Area Development and Community Support Program	Moderate to high adverse
Increased pressure on high altitude forests and grazing areas	All phases	Mild	Medium	Moderate adverse	• Forest management plan, including forest rejuvenation	Moderate adverse
Impacts of construction of 132 kV power supply line for project and colony	Pre-construction Construction	Mild	Medium	Moderate adverse	• Compensation of owners of land • Avoiding residential and agricultural areas and dense forest • Reduction of health hazards for community and workers	Minimal
Generation of sustainable employment	Construction and Operation	Mild	Medium	Moderate beneficial	• Fixed quota for local workers and technicians • Vocational training; monitoring of labor rights, workforce composition, working and living conditions	High beneficial
Increased economic activity	All phases	Mild	Medium	Moderate beneficial	• Establishment of new businesses and commercial enterprises; local employment	Moderate beneficial
Environmental Impacts during Construction:						
Increased traffic on KKH and local access roads	Construction	Severe	Medium	High adverse	• Traffic Management Plan, including awareness raising and safety measures	Low adverse
Impacts on Kaigah Community-managed Game Reserve	Construction	Severe	Medium	High adverse	• Monitoring of noise levels during the quarry operation • Reduction of duration, timing and strength of blasting operations and vibrations according to internationally recognized standards • Use of Kaigah quarry only for borrowing material for dam construction and construction of the new KKH section (limited period) • Control of access to the reserve area for workers and public in cooperation with the community • Awareness raising of workers, employees and general public regarding the importance of this area	Moderate adverse
Impact on river habitat due to construction activities and drying of river section between two coffer dams	Construction	Mild	Medium	Moderate adverse	• Control of waste water and sediment releases to river • Water quality management protocols in ECPs • Studies to improve aquatic baseline data; monitoring	Low adverse
Fish entrainment and mortality	Construction and Operation	Mild	Minor	Low adverse	• Protection measures at inlets of tunnels to deter movement of fish	Low adverse

Impact	Phase	Sensitivity	Magnitude	Significance Prior to Mitigation	Mitigation and Enhancement Measure	Residual Significance
Potential risk air, noise, soil and water pollution by construction works	Construction	Medium	Medium	Moderate adverse	• Pollution Prevention Plans to be prepared by Contractor • ECP plan by Contractor	Minimal
Risk of pollution from solid waste and waste effluents	Construction	Mild	Medium	Moderate adverse	• Waste Disposal and Effluent Management Plan • ECP by Contractor	Minimal
Loss of land in disposal areas	Construction	Low	Minor	Minimal	• Re-use plan for rock material • Disposal Area Management and Restoration Plan	Minimal
Impacts of noise and dust from construction, traffic and use of explosives	Construction	Severe	Medium	High adverse	• No blasting during night time • Awareness raising and grievance mechanism	Minimal
Increased risk of landslides	Construction and Operation	Severe	Medium	High adverse	• Permanent monitoring in construction areas • Preventive measures in high alert areas • Emergency Preparedness Plan	Low to moderate adverse
Impacts from increased human activities on flora and fauna	All phases	Mild	Minor	Moderate adverse	• Use of non-wood fuel for cooking and heating • Improvements to community forestry management • Code of conduct for workers and employees • Awareness raising for workers and protection of flora and fauna	Moderate adverse
Risk of water pollution of storage tanks in reservoir area	Construction	Mild	Minor	Low adverse	• Removal of oil tanks and other potential sources of pollution from reservoir area	Minimal
Shortages in local water supply and sanitation in residential areas	Construction	Mild	Medium	Moderate adverse	• Drinking Water Supply and Sanitation Plan to be prepared by Contractor independent from local domestic services	Minimal
Disturbance of visual landscape and natural habitats	Construction and Operation	Mild	Medium	Moderate adverse	• Landscaping plan; establishing nurseries • Plantation of trees	Minimal
Social Impacts during Construction:						
Safety hazards due to increased traffic especially for children and elderly people; increased risk of accidents, unsafe working conditions and health risks for workforce	Construction and Operation	Severe	Medium	High adverse	• Traffic Management Plan addressing general access • Safety and security actions and procedures to protect local community • Occupational Health and Safety Plan to be implemented • Emergency Preparedness Plan; Contractor follows IFC Performance; Standards on Labor and Working Conditions; • Safety training for workers	Low adverse
Possible conflict and tension between communities and migrants	Construction and Operation	Severe	Major	High adverse	• Awareness campaign • Development of Migration Management Plan • Grievance mechanisms to address complaints	Minimal
Conflict due to inpparopriate behavior by workers	Construction and Operation	Mild	Medium	Moderate adverse	• Awareness campaign; Code of conduct for workers • Grievance mechanism	Minimal
Reduced safety and health risks by interaction of workforce with local residents	Construction and Operation	Mild	Medium	Moderate adverse	• Public Health Action Plan • Safeguards and awareness raising against communicable diseases	Minimal

Impact	Phase	Sensitivity	Magnitude	Significance Prior to Mitigation	Mitigation and Enhancement Measure	Residual Significance
Increased load on local services and supplies	Construction	Mild	Medium	Moderate adverse	• Contractor to procure camp supplies in a manner not affecting availability of essential commodities	Minimal
Environmental impacts during Operation and Maintenance:						
Impact on 571 ha of aquatic habitat along Indus and its tributaries in reservoir area	Operation	Mild	Medium	Moderate adverse	• Developing of fish hatchery with native snow carps for stocking fish in the affected tributaries and reservoir • Monitoring of spawning areas • Monitoring programs	Low to moderate adverse
Impacts of first filling of reservoir on safety of people and livestock and stability of slopes	Operation	Severe	Major	High adverse	• Awareness campaign and warning signs • Slow rate (1 m/day) • Permanent monitoring of slopes	Minimal
Barrier effect to fish migration	Operation	Mild	Medium	Moderate adverse	• Compensatory fish hatchery • Study of fish migration; establishment of baseline data	Low to moderate adverse
Reduced water flows between dam and tailrace (4.4 km) during low flow season	Operation	Very Severe	Major	Critical	• Release of 20 m3/s of environmental flow from dam and 222 m3/s from tail race • Downstream monitoring and adjustment of flows if required	Moderate to high adverse
Impact on downstream and aquatic habitats and fish due to changes in water flows and quality (temperature, DO, sedimentation)	Operation	Mild	Medium	Moderate adverse	• Monitoring of downstream water quality and aquatic habitats	Low to moderate adverse
Impact of sedimentation on reservoir area	Operation	Severe	Medium	High adverse	• Yearly flushing after 10-15 years of operation • Reduction after completion of DB dam	Low adverse
Impact of daily reservoir operations during base-load operation	Operation	Mild	Moderate	Moderate adverse	• Fish Conservation and Management Plan • Monitoring and study	Low adverse
Impact on downstream fish and fisheries during flushing operation	Operation	Severe	Major	High adverse	• Flushing during high flow season (not in low flow/winter) • Development of ramp down criteria (5-10 cm/hr) • Monitoring dissolved oxygen and temperature in reservoir and de-stratification or simultaneous release of water from LLOs and spillways if required • Downstream monitoring of fish, habitats and sediments	Moderate to high adverse
Impact on downstream fish and fisheries due to changes in hydrological flows due to peaking operations	Operation (Post DB)	Mild	Medium	Moderate adverse	• Continuous operation of one turbine • Using remaining flow for peak operation	Low adverse
Risk of bird collision and electrocution with transmission cables	Construction and Operation	Mild	Medium	Moderate adverse	• Carrying out of avian risk assessment • Maintaining 1.5 meter spacing between energized components and grounded hardware; covering energized parts and hardware • Installing visibility enhancement objects such as marker balls, bird deterrents, or diverters	Low adverse

Impact	Phase	Sensitivity	Magnitude	Significance Prior to Mitigation	Mitigation and Enhancement Measure	Residual Significance
Social impacts during Operation and Maintenance:						
Creation of large number of employment opportunities through reservoir fisheries	Operation	Severe	Major	High beneficial	• Fish Conservation and Management Plan • Employment of local people	Beneficial

Details of Impacts given in the Table could be found in Chapter 7 of the main ESA report, March 2014 prepared by the Independent Consultants of WAPDA.

Other Relevant Issues

16. **Risk of earthquakes:** The Dasu project site is located in a zone with high seismic activity, classified as 'Serious Seismic Danger Zone'. The dam design is in accordance with the international standards (International Commission on Large Dams - ICOLD) for dam construction in an earthquake zone of class VIII. According to these standards the dam is considered to be safe under strong earthquake action. In the seismic hazard assessment also the risk of reservoir-triggered earthquakes was considered. A committee of international experts recruited by WAPDA finally reviewed and approved the dam design. This was done in accordance with World Bank Policy OP 4.37 Safety of Dams.

17. **Risk of landslides:** Landslides are common and natural phenomena in the mountain slopes along the KKH. Landslide-prone areas near the project site and reservoir have been identified and mapped. Any blasting activities required in these areas should be controlled and contained within a limited area. As much as possible explosives with a low intensity should be used. Extreme care would be exercised to protect workers and the public from the dangers of sudden landslides, which may occur during excavation and blasting works. Particularly during monsoon periods there might be increased risk of such incidents.

18. **Risk of flooding:** Although the risk of flooding in the Indus Basin might increase in the coming years due to rising air temperature, shift in rainfall pattern and increased melting of glaciers in the upstream regions, the risk of flooding and related damage in the area is low. Large floods as occurred with the unprecedented catastrophic flood events in July 2010 are not very likely to occur, since the Upper Indus Basin is outside the influence of the monsoon rains. More often rivers are blocked by an ice dam from glaciers. A lake is formed behind the glacier and through overtopping or collapse of the natural dam a sudden outburst flood can occur, sometimes with devastating results. About 60 North Pakistan glacial outburst floods have been reported since 1830.

19. **Climate change:** During the last decade substantial research is carried out to study the effects of long-term climate change on precipitation, air temperatures and droughts. Some of the main conclusions of these studies are:

- between 1980 and 2005 the frequency of heat waves (T >40º C) has been increased in north-western Pakistan. It is expected that there will be more frequent periods with extreme drought;
- based on predictions in scenarios of the International Panel on Climate Change (IPCC) estimates have been made by the Pakistan Meteorological Service of the increase in maximum daily temperatures, which ranges from 2.8º C to 4.2º C in the year 2080 for northern Pakistan;
- more heavy rainfall events during monsoon season will occur over north-western Pakistan instead of over the north-east of the country. Some models calculate 25 percent more rainfall during monsoon. As a result, areas along the western rivers of the country (Indus and Kabul) will be more vulnerable to flood episodes similar to the one experienced during 2010;
- water availability might increase considerably (during kharif) but not when it is required for agriculture in the plains (end of rabi season);
- a shift has been observed in the rainfall pattern with monsoons starting 1-2 weeks earlier and winter rains confined towards February.

20. From the studies it has been concluded that glaciers in the Himalaya and Karakorum are receding faster than happens in any other part of the world. From digital terrain models and satellite observations it might be concluded that the reduction of the thickness of ice in the Western Himalayan glaciers ranges between 0.50 to 0.90 m per year, although in some areas in the Karakorum an extension and increase of glaciers has been reported. In a likely scenario of global warming based on IPCC predictions the

reduction of the share of melt-water in the Indus discharge has been estimated at 8.4 percent. However this could be (over) compensated by an expected increase of precipitation in the downstream areas (in the NW of the country) which are under influence of the monsoon.

21. In view of the importance of these data for developing reliable and accurate knowledge of the basin hydrology and on future water availability of the Indus River the current project contributes to the following components WAPDA's catchment monitoring program including glacial studies, satellite monitoring and studies into the effects of glacial outbursts.

22. **Greenhouse Gasses Emissions:** Green House Gas (GHG) emissions during the construction (2014-2019) are mainly from CO2. Annual average emission of CO2 equivalents is 21,527 ton and 129,161 ton over the entire construction period of which 98% is CO2, which is very low as compared to other alternatives. The net GHG emission for DHP has been estimated using the Guidance Note of World Bank for Greenhouse accounting for Energy Investment Operations, ver. 1.0, June 2013. Total project emissions of DHP was estimated at 2.11 million ton CO2 equivalent, which emission compares very favorable against the baseline emission of the nearest least-cost alternative (combined cycle gas turbine) estimated over 50 year, generating a total baseline emission of 224,671,051 ton CO2 equivalent. The net emission of DHP is thus estimated at minus 223 million ton CO2 equivalent.

Cumulative and Induced Impacts

23. **WAPDA's Vision 2025 Program:** A cumulative impact assessment framework has been prepared on basis of WAPDA's Water Resources and Hydropower Program: "Vision 2025" prepared for planning of development of water and hydropower resources in the Indus Basin. Central in the assessment is the sequential development of DHP and Basha Project in relation to the operation of the Tarbela Dam, which presently is the most upstream located hydraulic structure in the Indus. From here the water is divided over the Indus Basin Water System (IBWS) mainly for agricultural use in the fertile plains of Punjab and Sindh, which is the bread basket from Pakistan.

24. **Strategic Sectoral Environmental and Social Assessment (SSESA):** Recently the Ministry of Water and Power of GOP contracted an international consortium of consultants with financing from the Water Sector Development Project (WCAP) funded by World Bank to undertake a SSESA. The study has the objective to look at the Indus Basin for sector wide environmental and social considerations including cumulative impacts to help prioritizing investments in hydropower and storage development projects. The study would provide recommendations on developing a mechanism for monitoring and evaluating the environmental and social performance of storage and hydropower projects in Pakistan. The study is at an advanced stage of completion.

25. **Temporal and spatial boundaries:** These boundaries have been based on Vision 2025 program, which includes the development of DHP (2015-2022, phase 1 and 2) and development of Diamer- Basha (expected to be operational in 2035). The assessment has been concentrated on possible cumulative effects of projects on: (a) river hydrology, (b) sedimentation (c) water releases downstream of Tarbela, (d) water supply for irrigation and drink water, (e) management of floods, (f) changes in habitat from river to lake type, (g) barriers for fish movement, (h) social impacts due to resettlement, loss of livelihood and income (i) damage to physical cultural resources, and (j) need for realignment of the KKH. Non-hydro developments are not very likely in this mountainous and rugged terrain belonging to the lower Himalayan and Karakorum mountain range. The only likely large scale development within this period could be construction of a new expressway or a railroad to improve access to the North of Pakistan.

26. **Expected development until 2030:** An overview of the HP projects scheduled until 2030 is given in Table 8.4. DHP (Run of River) and Basha (storage) are major hydropower projects, whereas the minor HP projects along the tributaries are much smaller and usually also Run of River projects or

sometimes small storage dams. DHP has a limited reservoir (24 km² only) with the only objective to generate hydropower (base-load and potentially peak-load in the future), whereas Basha has the objective to improve the storage capacity in the IBWS and to alleviate flood damage of the Indus River next to generating electricity.

Table 8.4: HP projects in the Upper Indus Basin (WAPDA Vision 2025)

	Project	Location	Storage (MAF)	Capacity (MW)	Completion date
1.	Diamer Basha [1)]	Diamer	8.10	4500	2030
2.	Dasu [1)]	Dasu	RoR	4320	2022 (stage 1)
3.	Six Minor HP Projects	Besham-Pattan	RoR	1606	2011-2017

Status: [1)] Ready for construction

Cumulative impacts and trends to be expected

27. **General:** DHP in combination with other proposed hydropower and storage projects has the potential to cause significant cumulative and induced impacts on physical, ecological and social resources in the UIB. Most of the expected cumulative impacts relate to hydropower development, since this is the only major structural development in the area. Influx of migrants and business men will be lower in Dasu since there is hardly any suitable place to accommodate large numbers of people and commercial business. In the Basha area there will be more physical space for small industries and commercial establishments to develop. A major limitation for any economic development is the poor condition of the KKH between Thakot and Rajkot bridge (the only lifeline to the outside world), which situation is constraining further economic and social development of the area. So far there are no plans to reconstruct this road section which is in difficult terrain and frequently blocked during days. The impacts on biodiversity and wildlife and the trends and concerns identified in DHP and DB are similar.

28. A summary of the main environmental concerns of cumulative impacts is tabulated below. The evaluation is based on the assumption that DHP (phase 1 and 2) is implemented in the period 2015- 2022 and that electricity from this project is generated as from 2020. DB project could be commissioned after 15 years from now and then starts generating electricity. Meanwhile in the period until 2025 all minor hydropower projects in the tributaries have been completed and are under operation.

Table 8.5: Summary of major environmental concerns regarding cumulative impacts

VEC	Feature	Major Concerns/Benefits	Mitigation/Management Plans
Physical environment			
Surface water	River hydrology	Positive impact due to increased control and management of river flow	Operational Plans for optimization of flow (WAPDA) Improved hydrological data from UIB (telemetric network etc)
	Sediment transport	- Positive benefits due to prolonged life of Tarbela and Dasu - Changes in sediment deposition might affect aquatic ecology	Monitoring of sediment deposition and effect on water quality
	Downstream water releases	More water available in downstream areas during low flow season	Improve water releases downstream (e.g. Kotri) in low flow season (WAPDA/Provinces)
	Water availability	- Improved water supply for irrigation (early kharif)	Maintaining irrigation demand in early kharif season (WAPDA)

VEC	Feature	Major Concerns/Benefits	Mitigation/Management Plans
		- More water available for maintaining environmental flow	Maintaining agreed environmental flow downstream of Tarbela (Provinces)
	Flood management	Improved flood attenuation and control during high flow season Improved control of GLOF events	Operational Plans (WAPDA)
Biological environment			
Aquatic habitat and fish	Downstream fish habitat	Reduced flows and/or increased surges in low flow season; Changes in downstream water quality (temperature and dissolved oxygen).	- Maintain recommended environmental flows - Monitoring of water quality downstream of Dasu
	Reservoir habitat	- Decrease in water quality is reservoir due to stagnating flow and potential risk of pollution by untreated waste water - Impacts on spawning areas of fish (Indus and tributaries)	- Study and monitoring of changes in aquatic habitat - Feasibility of hatcheries of snow carp/other species
	Barrier effect	Migration of snow carp in Indus tributaries Migration of Mahaseer in area downstream of Allai Khwar	- Detailed inventory of aquatic habitats and fish - Monitoring of catches
Biodiversity and forests Biodiversity and forests	Natural forests	Pressure on forests (illegal logging) by influx of workers & in-migrants	- Awareness raising in-migrants - Updated Forest inventories (GIS + field study) - Improved and sustainable forest management by Communities - Forest Rejuvenation and Management Plans
	Wildlife	Increased poaching, hunting and trapping; reduction or degradation of aquatic and forest habitats	- Awareness raising public, schools - Expand Community Managed game reserves
	Natural habitats	Flooding of natural habitats, degradation by increased overgrazing, firewood collection, etc.	- Inventory of terrestrial flora and fauna of downstream areas until Tarbela - Prepare Management Plans for sensitive areas (Palas)
		Lack of reliable data on terrestrial and aquatic ecology, wildlife and forests	- Implement inventories and studies on aquatic and terrestrial ecology
PCR	Archaeology	Loss of more than 31,000 petroglyphs along "Silk Road" by inundation of reservoir and/or vandalism from KKH travelers	- Prepare a salvage and management plan in cooperation with national and international archeologists - Establish a museum for display and information
Social behavior	Influx of migrants	Lack of respect for cultural norms and traditions local population	- Prepare Migration Management Plans - Awareness raising and Grievance address mechanisms
KKH	Access to area	Frequent blockage and poor maintenance KKH	Upgrade KKH to highway standards

Detailed discussion on each of the incremental impact is available in Chapter 8 of the main ESA report, March, 2014.

29. **Environmental Management Plan:** The environmental management plan (EMP) includes elements of slope stabilization, afforestation and watershed management in the upland areas along the

reservoir and the reconstructed KKH, enhancement of the aquatic life and fisheries through reservoir management, preservation and protection of cultural property (petro glyphs) and unforeseen issues that need to be addressed during the project. Construction related environmental issues will be addressed in the construction contracts, thus cost of such measures are included in the construction cost. The EMP would include those issues, which are not or cannot be covered under the construction contracts.

30. **Various categories of mitigating measures:** The Environmental Management Plan (EMP) includes various categories of mitigating measures. These are measures that can be grouped into three categories: (i) mitigating measures that can be included in the detailed design of the project; (ii) mitigating measures that can be included and worked out by the contractor(s) on basis of the EMP and an Environmental Code of Practices (ECP) enclosed in the Contract Documents, and (iii) stand-alone mitigation measures.

31. **Inclusion of EMP in Contract Documents:** In order to make contractors fully aware and responsible of the implications of the EMP and to ensure compliance, it is recommended that environmental measures will be included in the tender documentation. The contractor must be made accountable through contract documents and/or other agreements of the obligations and importance of the environmental and social components of the Project.

32. **Environmental Codes of Practice:** A set of environmental codes of practice (ECPs) have been prepared for various aspects of the environmental and social management: ECP 1: Waste Management; ECP 2: Fuels and Hazardous Goods Management; ECP 3: Water Resources Management; ECP 4: Drainage Management; ECP 5: Soil Quality Management; ECP 6: Erosion and Sediment Control; ECP 7: Top Soil Management; ECP 8: Topography and Landscaping; ECP 9: Quarry Areas Development and Operation; ECP 10: Air Quality Management; ECP 11: Noise and Vibration Management; ECP 12: Protection of Flora; ECP 13: Protection of Fauna; ECP 14: Protection of Fisheries; ECP 15: Road Transport and Road Traffic Management; ECP 16: Construction Camp Management; ECP 17: Cultural and Religious Issues; ECP 18: Workers Health and Safety; The contractors will be contractually obligated to comply with these ECPs, presented in Annex D of main ESA.

33. The following plans will be prepared to manage and mitigate/reverse potential adverse environmental impacts:

34. **Landscaping and Replanting Plan** will be prepared by a qualified landscape architect to replace or compensate the vegetation and trees lost during land acquisition and resettlement of villages, clearing of construction sites and other areas needed for construction activities such as borrow and disposal areas, batching plants, workshops and other facilities. Landscaping, restoration, and plantation methodologies will be included in the Plan. Tree species to be selected would be natural or semi-natural, adapted to the local (micro) climate and predominant soil conditions in the area. Establishment of one or more nurseries will be considered as part of the Forestry Rejuvenation Plan for upland forest resources. The Plan would be approved by the CSC and a landscape architect assigned by WAPDA.

35. Borrow Area Management and Restoration Plan for management and restoration of borrow areas will be prepared by the Contractor on the basis of ECPs 8 and 9 (Annex D of main ESA) and other requirements described in the mitigation plans (presented later in the Chapter). This Plan would aim at minimizing the environmental and social impacts during borrowing activities and restoring as much as possible the original natural situation of these sites by various measures (refill, leveling or smoothening) and removing all non-natural artifacts such as equipment parts, and sheds. Restoration methodologies will be included in the Plan. The Plan would be approved by the CSC and a landscape architect assigned by WAPDA.

36. **Disposal Area Management and Restoration Plan** for management and restoration of disposal areas will be prepared by the Contractor on the basis of ECP 8 and other requirements described in the mitigation plans. The Plan will describe the procedures for spoil management, transportation and disposal at the selected site(s). The Plan will also describe the procedures for systematically disposing the spoil at the disposal site. This Plan would aim at minimizing the environmental and social impacts during disposal activities and restoring as much as possible the original natural situation of these sites by various measures (landscaping, leveling or smoothening). The Plan will include measures to avoid land/soil erosion and landslides. Restoration methodologies will be included in the Plan. The Plan would be approved by the CSC and a landscape architect assigned by WAPDA.

37. **Occupational Health and Safety (OHS) Plan** will be prepared and implemented by each contractor on the basis of the IFC/WBG EHS Guidelines (1997), ECP 18, and other relevant standards. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

38. **Pollution Prevention Plan** will be prepared and implemented by the Contractor on the basis of the ECP 1, ECP 2, ECP 11, and IFC/WBG EHS Guidelines (1997), as well as the mitigation plans given later in the Chapter. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

39. **Waste Disposal and Effluent Management Plan** will be prepared and implemented by the Contractor on the basis of the ECP 1, ECP 4, and IFC/WBG EHS Guidelines (1997), as well as the mitigation plans. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

40. **Drinking Water Supply and Sanitation Plan:** Separate water supply and sanitation provisions will be needed for the temporary facilities including offices, labor camps and workshops in order not to cause shortages and/or contamination. A Plan will be prepared by the Contractor on basis of the ECP 3 and the mitigation plans given later in the Chapter. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

41. **Traffic Management Plan** (TMP) will be prepared by each contractor on the basis of ECP 15 and also the mitigation plans given later in the Chapter after discussion with WAPDA and authorities responsible for roads and traffic. The Plan will be submitted to the CSC/WEC for their review and approval before contractor mobilization. CSC will facilitate the integration and coordination of these plans to prepare an overall TMP.

42. **Construction Camp Management Plan:** will be prepared by each contractor on the basis of ECP 16 and also the mitigation plans given later in the Chapter. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal. The Plan will be submitted to the CSC for their review and approval before camp establishment.

43. **Fuel and Hazardous Substances Management Plan** will be prepared by each contractor on the basis of ECP 2 as well as the mitigation plans given later in the Chapter and in accordance with the standard operating procedures, relevant guidelines, and where applicable, material safety data sheets (MSDS). The Plan will include the procedures for handling the oils and chemical spills. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

44. An **Emergency Preparedness Plan** will be prepared by each contractor after assessing potential risks and hazards that could be encountered during construction. The Plan will be submitted to the CSC for their review and approval before contractor mobilization. A preliminary plans has been prepared by the design engineer and WAPDA and it would be finalized at least one year before the impoundment.

45. **Afforestation and Forest Rejuvenation Plan:** The forest areas above 1,500 m amsl are already being exploited in an unsustainable manner: harvesting only. It can be expected that this type of exploitation will increase since it is one of the few potential sources of income for the increasing population, whereas the project-induced move up mountain will result in additional stress on forest resources as well as on wildlife. In order to maintain a healthy forest ecosystem, modern management will have to be introduced, including planning of felling and rejuvenation (including nursery activities). Preparation of a Forestry Management Program by forestry consultants and in cooperation with the Forestry Department is urgently required. Implementation of such program would also create a relatively large number of jobs for forestry activities proper (including a nursery) and for enforcement of regulations. The Plan needs to be finalized before the commencement of main construction works. The Plan would include sustainable logging systems, rejuvenation schedules, nursery, manpower implications (forestry staff, guards) and a sound financial system to make the Plan self-sufficient. The ToRs of this Plan are presented in Annex B of main ESA.

46. **Ecological Conservation Plan:** Under this Plan, two wildlife conservation areas will be developed as offsets to the potential impacts of the project on Kaigah Community Game Reserve. This will be done on the basis of a thorough assessment and community engagements that will be carried out during the first year the preceding study on forestry and wildlife management (ToRs included in main ESA volume). A mechanism will be included in the Plan, whereby the local communities will be provided with appropriate incentives to help conserve natural habitat, wildlife and forests. These conservation areas will be further complemented by ecotourism initiatives, an information centre and research.

47. **PCR Plan. Under this Plan**, the mosques will be disassembled where possible, transported and reassembled at a higher altitude at the new location of the village, in consultation with the community. Also covered under the Plan will be the activities required (land procurement, fencing, protection of carvings, and tourist facilities) for the protection of rock carvings at Shatial. The Plan will also include archeological survey to be carried out by an archeologist engaged by WAPDA before the commencement of construction activities in the project area to identify any PCR sites/artifacts.

48. **Fish Conservation and Management Plan.** Under this Plan, specific measures will be identified and planned for the conservation of the aquatic fauna, particularly fish. The key element of this Plan will be the development of a snow carp hatchery with all the allied facilities for the primary objective of restocking the Indus River upstream and downstream of the Dasu main structure and also the tributaries (and also other Indus tributaries where smaller hydropower plants are being established/planned). This Plan will be developed on the basis of the aquatic (and terrestrial) baseline study (ToRs provided under the main ESA volume).

Overview of Impacts and Mitigating Measures

49. An overview of all impacts and mitigating measures, including responsibilities and monitoring requirements is given in the following Table 8.6

Monitoring Plan

50. The monitoring program has a dual purpose. It is designed (i) to monitor the contractor's work during project implementation in order to check contractual compliance with specified mitigation measures, and subsequently (ii) to assess the actual environmental and social impacts of the project over the years following completion of the various project components. The first type of monitoring will be carried out by the Engineering Consultant and supervised by an independent environmental management consultant. The second type of monitoring will be commissioned and carried out by a local organization or consultant with sufficient experience in environmental, ecological and social monitoring. The total cost

of monitoring has been estimated at US$ 0.50 m. Monitoring indicators and frequency are shown in the following Table 8.7.

51. The role of WAPDA is to select consultants, NGOs and organizations needed for implementing the EMP and the SRMP They will supervise progress and quality of EMP and SRMP and take over regular monitoring activities during O&M phase. Result of monitoring of impacts will have to be reviewed and evaluated from time to time by the M&E consultants. Findings might be used to revise the operational rules of the project.

52. **Third Party Monitoring:** WAPDA will engage qualified consultants to conduct third party monitoring on an semi-annual basis. The purpose of this monitoring will be to carry out an independent assessment and validation of the EMP and SRMP implementation.

Institutional Aspects

53. **PMU:** The overall responsibility for the implementation of the project rests with the PMU, headed by the Project Director (PD). Within the PMU there will be an Environment Unit (EU) - responsible for implementing the ESMP, and a Social and Resettlement Unit (SRU) - responsible for implementing the SRMP. The EU and SRU, headed by the Deputy Project Director-Safeguards, will include representatives of all actors responsible for ESMP/SRMP implementation.

54. The responsibilities of the EU and SRU will be: (i) supervising, facilitating and coordinating implementation of environmental and social plans including ESMP and RAP; (ii) ensuring that contractors follow KP-EPA regulations, World Bank Safeguard Policies, and other requirements mentioned in the ESMP and SRMP; (iii) identifying any issues of non-compliance and report these; (iv) suggesting mechanisms to link contractor performance in relation to the ESMP to the timing of financial payments, incentives or penalties; and (v) interacting with stakeholders for their concerns about the construction activities.

55. The EU will consist of three sub-units: Environment; Ecology; and Occupational Health and Safety – OHS, whereas the SRU will have four sub-units: Resettlement; Communication and Participation; Downstream Impacts; and Gender and Community Health.

56. **Construction Supervision Consultants** (CSC) will be responsible for supervising the contractors for the implementation of ESMP and SRMP. For this purpose, the CSC will appoint dedicated environment and social staff to ensure the ESMP and SRMP implementation during the project. They will supervise the contractor for the ESMP and SRMP implementation, particularly the mitigation measures. They will also be responsible for implementing the monitoring of effects of these measures.

57. **Contractors.** Each contractor will be required to appoint adequate number of dedicated Environment/Social Officers at the site for the implementation of ESMP in the field, particularly the mitigation measures. The contractor will also be responsible for communicating with and training of its staff in the environmental/social aspects. The contractor will develop the various plans directed towards health, safety, the environment and social issues, and get them approved by the CSC before the commencement of the physical works on site.

58. **Capacity Building and Training.** Capacity building will be aimed at strengthening the WAPDA organization in Dasu in the field of environmental management and social development. Members of the environmental/social unit responsible for supervision of environmental and social mitigation measures would be trained in environmental management, environmental quality control, ecology, environmental awareness, participatory approach and social development. Training would not be restricted to WAPDA staff, but selected project staff involved in construction and operation of the project

would also be trained. The contractor will also be required to impart environmental and social trainings to its staff, to ensure effective implementation of the EMP and SRMP. A budget of US$ 0.6 million has been earmarked for capacity building and training. In addition to the project-specific capacity building described above, WEC will be strengthened to actively partake in the environmental and social management of the WAPDA projects, particularly towards the effective ESMP implementation of the DHP, as well as the ESA studies and EMP and SRMP implementation of the forthcoming hydropower projects such as the Basha dam. Additional funds of US$ 0.3 million have been allocated to establish a GIS/MIS facility and for institutional strengthening of WEC.

Table 8.6: Overview of Impacts and Mitigation

IMPACTS/ISSUES	MITIGATION MEASURES	TIME FRAME	COST IN US$ x 10^6	RESPONSIBILITY		MONITORING INDICATORS	MONITORING FREQUENCY
				Implement	Supervision		
DASU HYDROPOWER PROJECT (overall impacts)							
1 Installation of 1,080 MW hydropower plant in phased development expanded to 4,320 MW at final stage through a run-of-river structure with minimal environmental and relatively low social challenges	Desirable outcome of project	2020 and after	Total of 3,650	Contractor	WAPDA	Power generated	Monthly
2 Expansion of Pakistan electricity generation with minimal Carbon emission	Desirable outcome of project	2020 and after		WAPDA	GoP	% hydropower of total power production	Annually
3 Stimulation of socio-economic development of one of the least developed districts of Pakistan	Creating structures and preconditions for further development of the district	From 2015onwards	p.m.	Civil administration	GoP	Socio-economic development indicators	Annually
A1- ENVIRONMENTAL IMPACTS DUE TO PROJECT SITING							
1 Change in land use and acquisition of land needed for reservoir, physical project infrastructure and construction will require the acquisition of 4,643 ha of land, including 425 ha of agricultural land	Compensation for land acquisition paid to the affectees (767 households); Temporary leasing of land needed for batching plant, construction workshops, labor camps and borrow areas	2014- 15	In RAP budget	PMU	WAPDA	Land acquired	Monthly until start of construction
2 Loss of natural vegetation and cutting of some 21,000 trees	- Replanting of 105,00 trees near resettlement sites and along roads - Promote alternatives for fuel wood	2014- 19	In EMP budget	WAPDA	Forest Dept	- Nr of trees planted - Nr of trees survived	Annually
3 Impacts on 31 community mosques.	Dismantling of wooden structure and rebuilding in the new resettlement villages at higher elevation.	2020	In EMP budget	Contractor	Local community, Archeology Dept.	Mosque rebuilt where needed and move where possible and agreed with the community	
4 Impacts of increased traffic and transportation (congestion, noise, air) on city of Dasu and along KKH	Prepare Traffic Management Plan and plan for by-pass road Dasu	2015-2022	In budget contractor	Contractor	- PMU - Local authority	Plan prepared	At start of construction
5 Inundation of 52 km of KKH	- Realignment of 62 km of KKH to higher level above	2014-16	KKH-1 39,600	Contractor	PMU	km of road rebuilt	Half yearly

IMPACTS/ISSUES	MITIGATION MEASURES	TIME FRAME	COST IN US$ x 10^6	RESPONSIBILITY		MONITORING INDICATORS	MONITORING FREQUENCY
				Implement	Supervision		
	reservoir - Construction of 13 km access road from Komila to dam site		KKH-2 110,000				
6 Loss of 2 suspension bridges and 3 other bridges, 5 footbridges and several cable cars	Rebuild bridge on Indus and develop access road all along the right bank	2014-16	In budget contractor	Contractor	PMU	- Number of bridges/river crossings rebuilt	Half yearly
7 Loss of 25 km of secondary access roads at right bank and other jeepable roads	Construct access roads on right bank of river at higher level giving access to side valleys and resettlement sites	2015-2016	In budget contractor	Contractor	PMU	- km of access roads built; - Number of resettlement sites connected.	Half yearly
8 Impacts on Kaigah Community-managed Game Reserve	Development of new conservation areas Compensation of lost income due to hunting	2014- 19	In EMP budget	PMU	Wildlife Dept in cooperation with WWF	- Number of hunting permits sold - Number of markhor sighted	Yearly
9 Increased pressure on high/altitude grazing areas and forests	- Forestry and Wildlife Management Study - Implement Forest Rejuvenation Plan	2015 and after	In EMP budget	WWF/Forest Dept/ Wildlife Dept	WAPDA	- Study implemented - Update Forest Assessment (GIS) - Hectares of forest planted/rejuvenated	Every 5 year
10 Impacts of construction of 132 kV power supply line for Project and Colony	• Compensation of owners of land; • Avoiding residential and agricultural areas and dense forest • Reduction of health hazards for community and workers	2014-2015		WAPDA/PMU			
11 Generation of employment in region	- Contractor attract local workers and technicians on basis of quota; - Development of fisheries in reservoir - Livelihood restoration; - Vocational training for local workers.	2015-22		Contractor	PMU	Number of employed workers from region	Annually
12 Increased activity in the project area will stimulate local economy	Indirect positive impact					Social development indicators	Annually
B1 - CONSTRUCTION STAGE: CONSTRUCTION-RELATED ENVIRONMENTAL IMPACTS							

IMPACTS/ISSUES	MITIGATION MEASURES	TIME FRAME	COST IN US$ x 10^6	RESPONSIBILITY		MONITORING INDICATORS	MONITORING FREQUENCY
				Implement	Supervision		
1 Increased traffic on KKH and local access roads due to project related vehicles, also from borrow areas.	Implement Traffic Management Plan, provide by-passes, take safety measures and repair damage	2015-2022	In budget contractor	Contractor	PMU	- Road status reports - Number of complaints	Permanent
2 Impact on river habitat during construction and loss of aquatic life between two coffer dams (temporarily) at the footprints of the dam (permanently)	- Study on significance of fish and monitoring - Implementation of ECPs	2015-20	In budget EMP	Fisheries consultant Contractor	Environment and Social Unit (ESMU) - DHP	- Study results published - Environmental flow maintained	Annually
3 Mortality of fish during downstream movement on spillway, intakes and inlets of hydraulic structures	Prevent fish passage by acoustic deterrent methods	2015-20	In budget fisheries contractor	Contractor	ESMU - DHP, Construction Supervision Consultants (CSC)	- Number of screens placed - Amount of restocking needed	Annually
4 Potential risk of pollution of air, noise, soil, surface water and groundwater from construction areas, yards, batching plants, quarry areas, worker camps and residential areas	- Prepare Pollution Prevention Plan; - Establish base line data - Implement measures prescribed in ECP	2015-22	In budget contractor	Contractor	ESMU-DHP, CSC	Usual chemical and bacteriological water quality parameters	Permanent
5 Pollution through solid waste and waste effluents from field camps and construction yards	- Waste Management and Effluent Management Plan; - Protocols and measures prescribed in ECP	2015-22	In budget contractor	Contractor	ESMU-DHP, CSC	- Plan ready and accepted; - Solid waste - Monitoring reports	Permanent
6 Potential loss of land by deposition of excess rock material	- Reduction of excavated rock material through re-use of material in construction works - Re-use plan for disposal areas	2015-22	In budget contractor	Contractor	ESMU-DHP, CSC	Area of arable land lost	
7 Impact from quarry activities	Implementation of ECPS Plan for Restoration of quarry Areas	2015-2019	In budget contractor	Contractor	ESMU-DHP, CSC	- Monitoring reports; - Percentage of plan implemented	Quarterly
8 Impacts of noise and dust from construction and use of explosives on residential areas and workers	- No blasting and drilling during night time; - Continued consultations with communities	2015-20	In budget contractor	Contractor	ESMU-DHP, CSC	- Noise levels - Number of complaints	Permanent
9 Increased risk of landslides and collapse of slope (use of explosives, heavy rainfall) during construction	Pro-active measures to stabilize and protect slopes and to protect workers safety	2015-19	In budget contractor	Contractor	PMU	Visual inspections	Permanent
10 Impacts from increased human activities on flora and fauna	- Code of conduct for workers and employees	2015-22	In budget contractor	Contractor	ESMU-DHP, Forest & Wildlife	- Number of incidents reported	Quarterly

IMPACTS/ISSUES	MITIGATION MEASURES	TIME FRAME	COST IN US$ x 10^6	RESPONSIBILITY		MONITORING INDICATORS	MONITORING FREQUENCY
				Implement	Supervision		
	- Awareness raising				Departments	- Monitoring reports	
11 Risk of water pollution in area that will be submerged	- Removal of oil tanks and storage facilities of chemicals and other products	2015-20	In budget contractor	Contractor	ESMU-DHP, CSC	Plan prepared	At start of construction
12 Shortages and/or negative effects on local water supply and sanitation	Prepare Drinking Water Supply and Sanitation Plan based on separate water supply and sanitation for work force	2015-22	In budget contractor	Contractor	ESMU-DHP, CSC	- Plan ready and accepted; - Number of complaints	Permanent
13 Impacts of emissions of gasses and dust on air quality due to earth moving activities, vehicle and generators emissions	Protocols and measures prescribed in ECP Permanent monitoring	2015-19	In budget contractor	Contractor	ESMU-DHP, CSC	-air quality - monitoring reports	Permanent
14 Impact on the ecological connectivity and composition of the aquatic fauna and migration of fish in Indus and tributaries between Raikot bridge and Tarbela	- Implement aquatic and terrestrial ecology baseline study - Monitoring of changes and recommendations for environmental flow	2014 - 15	In EMP budget	Ecological NGO in cooperation with Consultant or University	ESMU-DHP, CSC	- Monitor ecological parameters aquatic and terrestrial fauna	Seasonally
15 Disturbance of visual landscape and natural habitats	- Landscaping plan - Establishing nurseries - Plantation of trees	2015-22	In EMP budget	Contractor in cooperation with Forestry Dept	ESMU-DHP, CSC	- Acreage nurseries - Number of trees planted	Seasonally
16. Safety hazards and reduced mobility due to increased traffic especially for women, children and elderly people.	- Implement Traffic Management Plan; - Recruitment of trained drivers; - Adequate facilities for emergencies	2015-22	In budget contractor	Contractor	local health services	- Plan ready and accepted - Number of accidents - Number of incidents	Permanent
17. Possible tension and conflicts due to influx of about 5,000 immigrant construction workers, technicians and other staff and their families.	- Awareness campaign; - Implement Migration Management Plan - Grievance mechanisms to address complaints from local community and immigrants	2015-22	In SRMP budget	WAPDA/PMU Contractor	WAPDA/DCO/local leaders	Number of complaints	Permanent
18. Lack of respect for local cultural norms and values by workers coming from different parts of the country	- Awareness campaign; - Code of conduct for workers - Grievance mechanism to address complaints from	2015-22	In SRMP budget	Contractor/PMU	WAPDA/DCO/local leaders	Number of complaints	Permanent

IMPACTS/ISSUES	MITIGATION MEASURES	TIME FRAME	COST IN US$ x 10^6	RESPONSIBILITY		MONITORING INDICATORS	MONITORING FREQUENCY
				Implement	Supervision		
	local community						
19. Reduced safety and adverse effects on health situation by interaction of construction workforce with local residents, including spread of infectious diseases (hepatitis, HIV/AIDS)	- Implement Public Health and Safety Plan; - Safeguards and awareness raising against communicable diseases; - Gender Action Plan	2015-22	In SRMP budget		DoH/WAPDA	- Plans prepared and accepted - Incidence of infectious diseases - Health indicators	
20. Increased load on local services and supplies (markets, service providers, and others),	Contractor to procure the supplies in a manner not to significantly affect the availability of essential commodities in the area. Local area development support program;	2015-22	In budget contractor	Contractor	WAPDA		Permanent
21. Increased risk of accidents, unsafe working conditions and health risks for workforce	- Emergency Preparedness Plan; - Contractor follows IFC Performance Standards on Labor and Working Conditions; - Safety training for workers	2015-22	In budget contractor	Contractor	WAPDA	Plan prepared and accepted	Permanent
C1 – OPERATION AND MAINTENANCE STAGE: ENVIRONMENTAL IMPACTS							
1 Adverse impacts on aquatic fauna downstream of the dam site	Maintain environmental flow in low flood season	2020 and after	In EMP budget	Aquatic ecologist, Fishery Dept	ESMU-DHP, CSC	- Aquatic biota observed; - Trial catches of fish	Seasonally
2 Impacts of first filling of the reservoir on safety of people and livestock and the stability of valley slopes.	- Awareness campaign to inform local population; - Slow rate of filling to prevent collapse of slopes	2020	In EMP budget	WAPDA	ESMU-DHP, CSC	- Number of incidents - Rise in water level per day	Permanent
3 Impact of sedimentation on reservoir area	Yearly flushing after 10- 15 years operation	2020 and after		WAPDA	ESMU-DHP, CSC		Monthly
4 Impact of flushing on downstream fisheries of reservoir on fish production during base-load operations	Fisheries management plan including restocking	With the start of flushing and after		Fisheries Contractor	WAPDA	- Fish catches - Percentage of losses	Permanent
5 Impact of daily reservoir operation on downstream hydrology during peaking production	- Continuous operation of one turbine	after Basha		WAPDA	ESMU-DHP, CSC	Monitoring of downstream flows	Permanent

	IMPACTS/ISSUES	MITIGATION MEASURES	TIME FRAME	COST IN US$ x 10^6	RESPONSIBILITY		MONITORING INDICATORS	MONITORING FREQUENCY
					Implement	Supervision		
6	Increased human activities at higher altitudes will increase the pressure on forests and wildlife	Rejuvenation of high altitude forests and livelihood restoration concentrated on the reservoir area and the lateral valleys	2015 and after	Environ-mental Fund	Dept. of Forestry & Dept. of Wildlife	ESMU-DHP, CSC	- Number of incidents with illegal logging poaching, hunting. - Livelihood development	Permanent
7	Risk of bird collisions with transmission cables	Design of lines with 1.5 m spacing; Provide markers, bird deterrents in transmission cables	2020 and after	In budget NTDC	NTDC		Number of fatalities recorded	Weekly during migration
9	Efficient use of reservoir fisheries will create employment opportunities	Fisheries Management plan	2020 and after		Fisheries contractor	WAPDA	- Nr of jobs+ - Fish production	

Table 8.7: Effects Monitoring Plan

Parameter	Means of Monitoring	Frequency	Responsible Agency	
			Implementation	Supervision
During Construction				
Landslides	Visual Inspection on stability of landslide areas	Monthly	Contractor	CSC, DHP
Top Soil	Visual inspection on stripping, storage and reuse of top soil	Monthly	Contractor	EU-CSC, EU-DHP
Erosion	Visual inspection of erosion prevention measures and occurrence of erosion	Monthly	Contractor	EU-CSC, EU-DHP
Operation of quarry sites	Visual inspection of quarry sites	Monthly	Contractor	EU-CSC, EU-DHP
Surface water quality	Sampling and analysis of river water quality and waste water discharges for the parameters given in NEQS 2000	Quarterly	Contractor	EU-CSC, EU-DHP
		Annually	External Monitor (DHP through a nationally recognized Laboratory)	EU-CSC, EU-DHP
	Spot measurements of pH, conductivity, turbidity. Visual inspection on presence of petroleum products.	Monthly	EU-CSC	EU-CSC, EU-DHP
Air Quality (dust, smoke)	Visual inspection to ensure good standard equipment is in use and dust suppression measures (spraying of waters) are in place.	Weekly	Contractor	EU-CSC, EU-DHP
	Visual inspection to ensure dust suppression work plan is being implemented	Weekly	Contractor	EU EU-CSC, EU-DHP
Air Quality in tunnels	Spot measurements for CO and O_2 levels in the tunnels	Monthly	EU-CSC	EU-DHP
Air Quality (PM_{10}, NO_2, SO2, CO_2, CO)	Air quality monitoring for 24 hours for the parameters specified in NEQS 2000	Quarterly	Contractor	EU-CSC, EU-DHP
		Annually	External Monitor (DHP through a nationally recognized laboratory)	EU-CSC, EU-DHP
Emissions from plant and equipment	Visual Inspection	Monthly	Contractor	EU-CSC, EU-DHP
Noise and vibration	24 hour noise monitoring	Quarterly	Contractor	EU-CSC, EU-DHP
	24 hour noise monitoring	Annually	External Monitor (DHP through a nationally recognized laboratory)	EU-CSC, EU-DHP
	Spot measurements	Monthly	CSC	EU-DHP
Waste Management	Visual inspection on spoil disposal in accordance with EMP Sub plan on Waste Management	Monthly	Contractor	EU-CSC, EU-DHP
	Visual inspection that solid waste is disposed at designated sites	Monthly	Contractor	EU-CSC, EU-DHP
Spills from hydrocarbon and chemical storage	Visual Inspection for leaks and spills	Monthly	Contractor	EU-CSC, EU-DHP
Wild life (including migratory bird)	Surveys for wildlife and migratory birds in accordance with EMP Sub-Plan on Terrestrial and Ecology Management	Half yearly	DHP through nationally recognized institute	EU-CSC, EU-DHP

Parameter	Means of Monitoring	Frequency	Responsible Agency	
			Implementation	Supervision
	Ensure the adherence of the migratory measures proposed in the EMP	Monthly	DHP through nationally recognized institute	EU-CSC, EU-DHP
Fish	Surveys for fish in accordance with EMP Sub-Plan on Aquatic Ecology Management	Half yearly	DHP through nationally recognized institute	EU-CSC, EU-DHP, External Monitor
Traffic Safety	Visual inspection to see whether Traffic Management Plan (EMP Sub Plan 12) is implemented	Monthly	Contractor	EU-CSC, EU-DHP,
Local Roads	Visual inspection to ensure local roads are not damaged	Monthly	Contractor	EU-CSC, EU-DHP,
Cultural and archeological Sites	Visual observation on implementation of EMP Sub Plan 13 on Physical Cultural Resources Management	Monthly	Contractor	EU-CSC, EU-DHP,, External Monitor
Drinking water and sanitation	Ensure the construction workers are provided with safe water and sanitation facilities in the site	Weekly	Contractor	EU-CSC, EU-DHP,
Safety of workers	Usage of Personal Protective equipment	Monthly	Contractor	EU-CSC, EU-DHP,
Reinstatement of Work Sites	Visual Inspection	After completion of all works	Contractor	EU-CSC, EU-DHP,
Plantation	Visual inspection to ensure plantations are growing well.	Monthly	District Forest Office with support of civil society	EU-CSC, EU-DHP,, External Monitor
During Operation				
Surface Water Quality	Sampling and analysis for sediment load, DO and temperature	Half Yearly	DHP through nationally recognized laboratory	CSC, External Monitor
	In situ measurements on DO and Temperature at different depths in the reservoir	Quarterly	DHP through nationally recognized laboratory	CSC, External Monitor
Aquatic biota and fish	Collection of information on presence, seasonal behaviour and biotope characteristics of selected species at selected locations	Seasonally	DHP through qualified fishery expert together with aquatic biologist	External Monitor
Downstream river flows	Measurements of discharges to the downstream	Monthly	DHP	External Monitor
Migratory birds	Surveys for migratory birds in accordance with EMP Sub-Plan on Terrestrial and Ecology Management	Half Yearly	DHP through nationally recognized institute	EU-DHP, External Monitor
Fish	Surveys for fish in accordance with EMP Sub-Plan on Aquatic Ecology Management	Half yearly	DHP through nationally recognized institute	EU-DHP, External Monitor
	Monthly data on fish catches	Monthly	Fisheries Contractor	EU-DHP,
Dam Safety	Monitoring of data from dam safety equipment	Quarterly	DHP	Dam Safety Organization of WAPDA
	Survey, inspection and testing	Yearly	Dam Safety Organization of WAPDA	DHP
	Survey, inspection and testing	Once in three years	External Monitor (DHP through an internationally recognized institute)	DHP

59. Panel of Experts. WAPDA will engage an independent panel of environment and social experts to advise ESMU and other project entities on all environmental and social matters including effective implementation of EMP and SRMP, particularly on unanticipated situations, impacts, and their mitigation. The Panel will review on a regular basis the various reports and documents produced by

EMU, Supervision Consultants and contractors; periodically visit the site to have first-hand information on the environmental and social impacts and EMP/SRMP implementation; and provide report to WAPDA on the overall environmental and social performance of the project. An amount of US$ 0.43 million has been included in the Project cost for this purpose.

60. **Audits:** Internal Environmental Audits will be held once during construction phase and once at the end of the construction activities. The objective of the audits is to review the effectiveness of environmental management. It is proposed that WEC would carry out these audits on six-monthly basis. External audits on the implementation of the ESMP and SRMP will be made by an independent industrial environmental management specialist on an annual basis. These audits would be used to re-examine the continued appropriateness of the ESMP and SRMP and to provide advice on any up-dates required.

Cost of ESMP

61. The cost of implementing ESMP is shown in the following Table 8.8.

Table 8.8: ESMP Implementation Cost Estimates

Description	**Estimated Cost in (million US$)**
Implementation of ESMP by contractor	18.32
Environment staff in CSC	4.33
Environment staff in PMU	2.18
Internal auditing	0.20
External monitoring	0.50
Panel of experts	0.43
Capacity building, institutional strengthening	0.90
Monitoring of water and waste water quality	0.54
Spot monitoring of air, noise and water quality	0.44
Traffic management	1.54
Aquatic ecology and development of fisheries	6.22
Terrestrial ecology, forestry and nature conservation	6.75
Environmental management and enhancement of resettlement villages	2.10
Physical cultural resources	1.74
Provisional budget for implementation of additional offset measures, including those for 500 kV transmission line, if required	7.0
Weather station in Colony	0.15
Glacier, Flood warning, climate change, watershed management	10.50
Total	**63.84**

Annex 9: Consultations, Disclosure and Communication strategy
Dasu Hydropower Stage-I Project

Overview

1. Extensive consultations were carried out during the detailed design phase of the project, primarily through community consultations, *jirgas* and stakeholder consultation workshops. Community consultations involved multiple methods – for example, household level interviews, participatory rural appraisal (PRA), community meetings, and focus group discussions (FGD). Given the cultural context, key issues were largely addressed by community elders at *jirga* meetings. In some sense, standard participatory tools such as PRA and FGD and small group meetings are constrained by the tribal political and decision-making systems. Therefore, *jirga* meetings are the predominant modes for disclosure and decision-making in the project area. Objectives of the consultation process are:

- Analyze household and community level issues and draw early attention for mitigations and/or resolution of the same issues
- Promote participation of the local people, local level government stakeholders, elected representatives and other community representatives to create opportunity to play a role and express their views
- Acquire suggestions of the community for mitigating any anticipated adverse environmental and social impacts and expected benefits of the Project;
- Obtain the views of various categories of vulnerable groups, discuss project impacts and benefits on these groups, and ascertain their expectations regarding project benefits
- Develop strategies to minimize potential social and environmental adverse impacts in conjunction with government stakeholders
- Promote pro-people and community-based resettlement and development strategies
- Socially prepare the community with confidence and capacity to deal with displacement, environmental and resettlement management.

(iv) A total of 2,392 persons were involved in various consultation meetings at the project sites and consultation workshops (**Table 9.1**) between April 2012 and October 2012. A final round of public consultations was held in Dasu, Islamabad and Peshawar in February 2014, which was in full accordance with the national ESA review and approval process. Organized by the KP-EPA, this final round of consultations was attended by WAPDA officials, media, local representatives, and most importantly, local community members.

Table 9.1: Number of Participants in Various Consultation Meetings

	Activities	No. of participants
1.	Social environmental surveys and inventory survey	1,435
2.	*Jirga* meetings, consultation meetings	718
3.	National consultative workshops	239
Total		**2,392**

Community Consultations

2. Community consultations were held during the feasibility study in 2007. A summary of consultations undertaken during feasibility study is given in **Table 9.2**.

Table 9.2: Summary of consultations undertaken during Feasibility Study

	Date	Objectives	Person/agency consulted	No. of participants
Social survey conducted in the reservoir area only				
1	2007	Social economic survey	602 households	602

	Date	Objectives	Person/agency consulted	No. of participants
2	2007	Business survey	25 business activities	25
Group discussions at scoping sessions				
2	Apr. 29, 2007	To share the perceptions and develop a better understanding and contribution towards preparation of the Feasibility Study Report	Representatives, Village Seo	11
3	Jun. 24, 2007		Representatives, Village Segal	15
4	Nov. 3, 2007		Representatives, Village Seglo and Commercial Activities	22
5	Nov. 3, 2007		Representatives, Village Seo	25
6	Nov. 4, 2007		Representatives, Village Khashai and Choochang	21
7	Nov. 4, 2007		Representatives, Village Kaigah	14
8	Nov. 6, 2007		Representatives, Village Sazin	10
9	Nov. 6, 2007		Representatives, Village Shatial	15
10	Nov. 6, 2007		Representatives, Village Darel Bridge	10
11	Nov. 6, 2007		Reps., Village Samar Nullah	18
Total				**788**

Source: Feasibility Study EIA, 2009

3. During detailed design phase, consultation meetings were conducted in 34 villages in the month of June 2012. Details of the consultations are given in **Table 9.3**.

Table 9.3: Consultations with Community Representatives

	Date	Side of the River	Name of Village	No. of Participants
1	27-06-2012	Right Bank	Kass	9
2	24-06-2012	Right Bank	Rango	10
3	24-06-2012	Right Bank	Seo	13
4	11-06-2012	Right Bank	Siglo	6
5	02-06-2012	Right Bank	Melar	12
6	03-06-2012	Right Bank	Kuz Kai	2
7	03-06-2012	Right Bank	Kai Dogha	4
8	04-06-2012	Right Bank	Seer Gayal	8
9	05-06-2012	Right Bank	Kot Gal	11
10	06-06-2012	Right Bank	Not Bail	13
11	06-06-2012	Right Bank	Sluch	12
12	10-06-2012	Right Bank	Thuti	16
13	08-06-2012	Right Bank	Warisabad	8
14	25-06-2012	Right Bank	Doonder	12
15	17-06-2012	Right Bank	Gummo	9
16	09-07-2012	Right Bank	Cheer Chial	12
17	12-06-2012	Right Bank	Khaliqabad	7
18	26-06-2012	Left Bank	Chuchang	12
19	24-06-2012	Left Bank	Khoshi	25
20	23-06-2012	Left Bank	Logro	27

	Date	Side of the River	Name of Village	No. of Participants
21	10-06-2012	Left Bank	Uchar Nallah	6
22	09-06-2012	Left Bank	Barseen	10
23	10-06-2012	Left Bank	Largani	10
24	08-06-2012	Left Bank	GulBagh/Maidan	12
25	06-06-2012	Left Bank	Kaigah	15
26	12-06-2012	Left Bank	Pani Bagh	12
27	09-06-2012	Left Bank	Gadeer	2
28	29-06-2012	Left Bank	Chalash	9
29	21-06-2012	Left Bank	Looter	14
30	19-06-2012	Left Bank	Shori Nallah	14
31	15-06-2012	Left Bank	Summar Nallah	15
32	18-06-2012	Left Bank	Lachi Nallah	7
33	14-06-2012	Left Bank	Sazeen Camp	5
34	20-06-2012	Left Bank	Shatial	26
			Total	**385**

4. In addition to the consultation meetings, one on one consultation was held with 1,487 people during environmental and social surveys. Details of these consultations are given in **Table 9.4**.

Table 9.4: Summary of the Consultations undertaken during Detailed Design

	Date	Objectives	Person/agency consulted
1	May-July, 2012	Social economic survey	319 households
2		Resettlement Inventory survey	763 households
3		Environmental baseline survey	63 households
4	Aug. 2012	Gender survey	250 women respondents interviewed at Basic Health Unit (BHU) and Rural Health Center (RHC),
5	July.-Sep. 2012	Ecological Survey	Focus group discussions on fish and wildlife. With 40 persons
6	Aug-Sep. 2012	Consultation on availability of relocation sites	26 over 35 sub-tribes consulted (52 village leaders participated)
Total			**1,487**

Jirga Meetings

5. The Jirga is like a local "workshop", in which the tribal elders deliberate on important political, legal and development issues. As an important political instrument and political process, the Jirga system plays a vital role in the social, economic and political spheres. Local jirgas in a tribal setup is called by an elder of a tribe for settling local affairs within the family, clan, sub-tribe and tribe. The jirga exercises both judicial and executive roles to settle all disputes pertaining to the distribution of land, properties, blood feuds, blood money and other important inter-tribal affairs on the basis of tribal conventions, traditions and principles of justice. Often grand jirgas are convened to resolve issues of regional and national interests.

6. Prior to starting of detailed design, a grand Jirga meeting was held on 28th July 2011, in which a list of demands (Charter of Demands) were submitted to the Project Director, DHP on behalf of the affected people of the Project. The list was signed by Abdul Sattar Khan, Member of Province Assembly, KP.

7. Three Jirga meetings were conducted during detailed design to inform the community leaders about the project, its details and potential impacts, and seek their participation in social and environmental assessment. Details of Jirga meetings are given in **Table 9.4**. In the first Jirga meeting held in March 2012, a committee of 'List of Notables' was formed by the Jirga to assist in environmental assessment. A new committee of 'Affectees of Dasu' was formed during the Jirga meeting in September 2012.

Table 9.4: Details of Jirga Meetings

	Date	Details of Participants
1	28 Jul. 2011	Members of Grand Jirga (35 members) Abdul Sattar Khan, Member of Province Assembly, KP;
2	2 Mar. 2012	Total participants: 114 persons 1. Project affected tribes/sub-tribes; 2. Jirga members 3. Relevant governmental agencies
3	8 June, 2012	20 participants (*Jirga* members)
4	27 September 2012	112 participants (*Jirga* members and community)

Issues Discussed

8. The main issues discussed with affected persons and communities are listed in **Table 9.5** and how these issues are addressed and incorporated is also shown in this table.

Table 9.5: Summary of Discussions in Consultation Workshops

Comments and Suggestions	Action Point/Response
Development of an agricultural terrace in the hilly areas will take several years of effort and hard work. Development of agricultural terraces to be considered for the affected households in their new resettlement areas.	Agricultural terraces will be developed in the resettlement sites.
PCRs in the area are to be properly documented.	A detailed report has been prepared on PCRs. Details are included in the PCR Plan.
The people in Kohistan have a unique social culture, which may be affected by resettlement.	The social structure of the affected people will not be disturbed and will remain the same. Relocation of the affected people will be still within their annual migration range.
There is a concern that existing health facilities will not be enough to meet local and in-migrant workers' needs.	A Public Health Action Plan has been developed. Public health issues such as safe drinking water, safe disposal of sewage, safe collection and disposal of solid waste, protection against dust and community health are considered as part of ESMP.
Protection of aquatic flora and fauna should be considered in project design. Requirement of environmental flows for the sustainability of downstream habitat is to be assessed.	Environmental flows will be designed for the project. But determining how much flow will need to be released requires further studies. It is an established practice in Pakistan to design 10% of average minimum monthly flow as environmental flows. Actual assessment should be based on the habitat requirement.

KKH is the lifeline of northern areas as it is the only highway connecting northern areas with rest of Pakistan. Impact of construction traffic on KKH has to be assessed.	A Traffic Management Plan is prepared to address the traffic related issues along KKH and along the access roads to the project sites.
Impacts during demobilization of contractors are to be considered in the ESA.	Contractors' demobilization is considered in the ESMP and ECPs.
WAPDA shall have an Environmental Monitoring Unit at the project site for supervision of ESMP implementation.	An Environmental Unit is recommended for both DHP (WAPDA) and the CSC.
Initial filling of reservoir may affect the downstream release of water to rabi crops.	The first filling of the reservoir will be carried out slowly at the rate of 1 m/day. The rest of the river water will be allowed to flow downstream of the dam through LLO. No impact on rabi crops is expected. The first reservoir filling will take over eight months to complete.
Low flow seasonal operation of the dam and its impact on aquatic life needs to be considered.	The reservoir will be operated as a run-of-river project (base-load plant). There is limited storage of water in the reservoir and whatever water will be used for generating electricity will be returned to the river. In this way a guaranteed environmental flow will be maintained towards downstream habitat.
Project design shall consider geo-hazards (landslides, earthquakes and faults) in the area.	The project is designed to comply with ICOLD guidelines to deal with geological and geomorphological hazards. State of art engineering modeling was carried out for the design of the dam.
Floods from GLOFs will be a serious risk to the project. Early warning system for flood forecasting is necessary for the safe operation of the project.	Design flood (Probable Maximum Flood) of the project considered extreme flood events from GLOFs and extreme rainfall events. A flood telemetry network will be established upstream of Dasu for early warning system and better management of floods.
Security issues are to be considered during implementation of the project.	Security situation in the project area is assessed and a plan is prepared to address these issues in the SRMP volume on Hydropower Development, Conflict and Security Issues: A Perspective.
Historical and archaeological sites are to be protected. DHP should support the Archaeology Department of Peshawar for protection of Shatial rock carvings, a designated archeological site.	The PCR Plan considered the protection of Shatial rock carvings.
Impact on the community and their livelihood due to relocation to higher elevation.	A livelihood restoration program is proposed in the RAP with both short-term and long-term goals to mitigate any impacts on livelihood.
Community based conservations should be promoted. The conservancy at Kaigah where the Markhor is protected by private arrangement and sale of one trophy annually for $100,000 is a good example.	The project identified a suitable site in the project area (Kandia valley) for development of similar community based conservation.

Traffic on KKH requires careful planning if construction of DB and Bunji projects start along with Dasu.	Currently there is no confirmed schedule available on construction of DB and Bunji. This issue is further studied as part of the Cumulative and Induced Impact Assessment (CIIA).
There are no proper health facilities in Kohistan. Health and safety of construction workers and host community need to be planned.	A Public Health Action Plan has been prepared to address these issues.
Indus valley is a flyway for migratory birds from Siberia to the subcontinent. Impact of transmission line on birds' migration has to be assessed.	Bird collision and electrocution are potential threats to migratory birds. These issues will be addressed in the transmission line ESIA.
Electromagnetic waves from transmission lines and their impact on human health to be assessed.	These issues will be addressed in the transmission line ESIA.
Cumulative impacts of hydropower development on Upper Indus Basin and Lower Indus Basin should be monitored.	The present assessment limits its scope in the Upper Indus Basin (Tarbela Catchment). A detailed study is in pipeline from WCAP on SSESA of the Indus Basin.
Impact on migratory birds and important bird areas to be assessed.	The DHP reservoir may have a positive impact as staging area on the migration of birds.
Indus river ecology should be protected. Feasibility of fish ladders should be studied.	Detailed studies on terrestrial and aquatic ecology were under taken as part of environmental assessment of the project.
Climate change impacts may trigger GLOFs, high erosion and sedimentation; and finally may affect the project.	A climate change assessment study was under taken as part of the environmental assessment.
Habitat management plan for endangered species is to be proposed.	A community conservation area is proposed for protection of important fauna in the project area such as Markhor, Musk deer, Monal and Tragopan pheasant.
Lost community facilities in the affected villages are to be restored in the new resettled villages.	All basic amenities like roads, water supply, irrigation, sanitation, schools and any other facilities that were lost will be built in the new resettlement areas.
Involvement of local community in planning and development process is very important.	Consultation meeting were carried out in all the project villages through PRA techniques.
Need to ensure timely & frequently stakeholders meetings for suggestion and feedback.	WAPDA has established a full time office at Dasu which is constantly providing a forum to consult on any and all issues. An Executive Engineer of WAPDA heads the office. DCO is also involved.
Proper compensation of affected community is needed, to make it more transparent & clear; affected persons need to be provided proper guidance.	Recommended in RAP.
Capacity of WAPDA in term of human resources needs to be increased to address environmental and social issues.	Field level environmental and social units will be established in DHP.
Potential livelihood and income generation activities should be started.	Short-term and long-term livelihood restoration plans are recommended in RAP.

Education sector is very important in this area. Focus on education and health sector.	Education and health will be considered in the SRMP.
Involvement of women is very important. Livestock related livelihood activities for women should be designed.	A Gender Action Plan is prepared.
Mobilization of women for capacity building related to income generation activities needs to be more focused	A Gender Action Plan is prepared.
Invertebrate fauna / aquatic flora should be addressed.	These are part of the aquatic ecology assessment
A fish hatchery should be established.	A fish hatchery will be established, initially for research and development and later for full scale development when farming of snow carp is feasible in the reservoir.
Local people need to be provided support for terrace farming.	Recommended in RAP.
Livestock farming can be undertaken through providing quality animal breeds.	Recommended in RAP.

Consultation Workshops

9. A summary of comments and suggestions received in the consultation workshops is given in **Table 9.6**.

Table 9.6: Summary of Discussions in Consultation Workshops

Comments and suggestions	Action Point/Response
Development of an agricultural terrace in the hilly areas will take several years of effort and hard work. Development of agricultural terraces to be considered for the affected households in their new resettlement areas.	Agricultural terraces will be developed in the resettlement sites.
Physical cultural resources in the area are to be properly documented.	A detailed report has been prepared on Cultural Resources. Details are Included in the PCR Plan.
The people in Kohistan have unique social culture, which may be affected by resettlement.	The social structure of the affected people will not be disturbed and will remain same. Relocation of the affected people will be still within their annual migration range.
It is apprehended that existing health facilities will not be enough to meet local and inward migrant workers' need. How the Project will address these health needs?	A public health action plan has been developed. Public health issues such as safe drinking water, safe disposal of sewage, safe collection and disposal of solid waste, protection against dust and community health are considered as part of ESMP.
Protection of aquatic flora and fauna should be considered in project design. Requirement of environmental flows for the sustainability of downstream habitat is to be assessed.	Environmental flows will be designed for the Project. But the assessment on how much flows to be released require further studies. It is an established practice in Pakistan to design 10 percent of average minimum monthly flow as environmental flows. But actual assessment should be based on the habitat requirement.
KKH is life line of northern areas as it is only	A traffic management plan is prepared to address the

Comments and suggestions	Action Point/Response
highway connecting northern areas with reset of the Pakistan. Impact of construction traffic on KKH to be assessed.	traffic related issues along KKH and along the access roads to the Project sites.
Impacts during demobilization of contractors are to be considered in the EIA	Contractors' demobilization is considered in the ESMP and ECPs.
WAPDA shall have an Environmental Monitoring Unit at Project Site for supervision of ESMP implementation.	An Environmental Unit is recommended for both DHP (WAPDA) and supervision consultants.
Initial filling of reservoir may affect the downstream release of water to Rabi crops	The first water filling of reservoir will be carried out slowly at the rate of 1 m/day. The rest of the river water will be allowed to flow downstream of the dam through LLO. No impact on Rabi crop will be expected. First reservoir filling will take over 8 months to complete.
Low flow season operation of the dam and its impact on aquatic life to be considered.	The reservoir will be operated as full runoff river (base load plant). Whatever water comes to the reservoir, the same will be released through the power house. Further, environmental flows will be released to maintain the downstream habitat.
Project design shall consider geohazards (landslides and earth quakes) in the area.	The Project is designed complying with guidelines of International Commission on Large Dams (ICOLD) to deal with geological and geomorphological hazards. State of art engineering modeling was carried out for design of dam.
Floods from GLOFs will be a serious risk to the Project. Early warning system for flood forecasting is necessary for the safe operation of the Project.	Design flood (Probable Maximum Flood) of the Project considered extreme flood events from GLOFs and extreme rainfall events. A flood telemetry network will be established in the upstream of Dasu for early warning system and better management of floods.
Security issues are to be considered during implementation of the Project.	Security situation in the Project area is assessed and a plan is prepared to address these issues in one of the SRMP volume on 'Hydropower Development, Conflict and Security Issues: A Perspective'
Historical and archeological sites are to be protected. DHP should support the Archeology Department of Peshawar for protection of Shatial rock carvings, a designated archeological site.	The PCR plan considered the protection of Shatial rock carvings.
Impact on the community and their livelihood due to relocation to higher elevation.	A livelihood restoration program is proposed in RAP with both short term and long term goals to mitigate any impacts on livelihood.
Community based conservations should be promoted. The conservancy at Kaigah where Markhor is protected by private arrangement and an annual hunting license is auctioned for about $20,000 is a good example.	The Project identified a suitable site in the Project area (Kandia valley) for development of similar community based conservation.
Traffic on KKH requires careful planning if construction of Basha and Bunji projects start along with Dasu.	Currently there is no confirmed schedule available on construction of Bash and Bunji. This issue is further studied as part of the CIIA.
There are no proper health facilities in Kohistan. Health and safety of construction	A public health action plan is prepared to address these issues.

Comments and suggestions	Action Point/Response
workers and host community need to be planned.	
Indus valley is a flyway for migratory birds from Siberia to Sub Continent. Impact of transmission line on birds' migration to be assessed.	Bird collision and electrocution are potential threats on migratory birds. These issues will be addressed in the Transmission line EIA
Electromagnetic waves from transmission lines and their impact on human health to be assessed.	These issues will be addressed in the Transmission line EIA
Cumulative impacts of hydropower development on Upper Indus Basin on Lower Indus Basin should be monitored.	The present assessment limits its scope of Upper Indus Basin (Tarbela Catchment). A detailed study is in pipeline from WCAP on 'Strategic/Sectoral Environmental and Social Assessment of Indus Basin'
Impact on migratory birds and important bird areas (IBA) to be assessed.	DHP will have a positive impact on the migratory birds.
Indus river ecology should be protected. Feasibility of fish ladders should be studied.	Detailed studies on terrestrial and aquatic ecology were under taken as part of environmental assessment of the Project.
The Project design should consider geological hazards (seismic activity and faults) in the Project area.	The Project is designed complying with guidelines of International Commission on Large Dams (ICOLD) to deal with seismicity and faults. State of art engineering modeling was carried out for design of dam.
Climate change impacts may trigger GLOFs, high erosion and sedimentation; and finally may affect the Project.	A climate change assessment study was under taken as part of EA.
Habitat management plan for endangered species is to be proposed.	A community conservation area is proposed for protection of important fauna in the project area such Markhor, musk deer, monal pheasant and Tragopan peasant.
Lost community facilities in the affected villages are to be restored in the new resettled villages.	All basic amenities like roads, water supply, irrigation, sanitation, schools and any other facilities that were lost will be built in the new resettlement areas.
Involvement of local community in planning and development process is very important.	Consultation meeting were carried out in all the project villages through PRA techniques.
Ensure timely & frequently stakeholders meetings for suggestion and feedback.	WAPDA has established a full time office at Dasu which is constantly providing a forum to consult on any and all issues. An Executive Engineer of WAPDA heads the office. DCO is also involved.
Proper compensation of affected community is needed, to make it more transparent & clear; affected persons be given proper guidance.	Recommended in RAP.
Capacity of WAPDA in term of human resources needs to be increased to address social and environmental issues.	Field level social and environmental units will be established in DHP.
Potential livelihood and income generation activities to start	Short term and long term livelihood restoration plans are recommended in RAP
Education sector is very important in this area. Focus on Education & Health sector.	Education and heath will be considered in the social development plan and benefit sharing of the Project
Involvement of women is very important. Design livelihood livestock related activities	A Gender Action Plan is prepared.

Comments and suggestions	Action Point/Response
for women.	
Mobilization of women for capacity building related to income generation activities need to be more focused	A Gender Action Plan is prepared.
Invertebrate fauna/aquatic flora should be addressed	These are part of aquatic ecology assessment
Establishment of fish hatchery	Fish hatchery will be established, initially for R&D, and then later for full scale development if the farming of snow trout is feasible in the reservoir.
Motivate local people for terrace farming.	Recommended in RAP
Livestock farming through providing quality animals breeds	Recommended in RAP

10. **Disclosure.** Both the Urdu and the English versions of the draft ESA summary were distributed to local authorities and relevant stakeholders in advance of the above referred consultations held in February 2014. Copies of these documents as well as the full ESA report are available at the site project office, as well as at relevant offices in Lahore. The Summary and the ESA document have been published on the website of WAPDA and Infoshop on January 23, 2014. The Summary and the ESA document have been published on the website of WAPDA.

COMMUNICATIONS STRATEGY

11. **Objective and development**. Recognizing the significance of hydropower in the country's development and the high profile of the project, WAPDA has developed a Communications Strategy for Dasu Hydropower Project with the objective

- To enhance transparency of the Project
- To promote and increase participation of key stakeholders in decision-making
- To increase awareness, improve knowledge, and timely disseminate information among key stakeholders
- To get public support of the Project

12. A communications need assessment was conducted in 2012 to inform the development of the strategy. This was conducted by a team of communication experts engaged by WAPDA, through field surveys, in-depth interviews, national consultations, media analysis, and desk research. The objectives of the assessment were to map various stakeholders, formulate principles for developing the strategy, identify measures that can be taken for effective communication, evaluate WAPDA's communications capacity; and advise on the development of a Communications Strategy for DHP. The communications need assessment also identified the political, social, and cultural environment of the project, and assessed the position of project stakeholders in terms of their respective knowledge, perceptions, attitudes, expectations, and practices that can be taken into account while designing and developing initiatives under the project. The assessment looked into the national and local media environment, concerns from stakeholders, potential challenges, audiences to be reached, channels of communications and capacity of WAPDA to conduct effective communications for Dasu Hydropower Project. A communication strategy was developed on the basis of this assessment.

13. **Strategy**. The strategy focus on the following key areas,

- *Internal Communications* to increase knowledge, build support for the implementation of the DHP and address new and existing concerns among staffs of the project, other related government departments, and various institutions involved

- *Provision of timely information* on the project, its impacts, its timing, its progress, together with a mechanism to express their concerns and grievances and ensure that these are properly taken into account in the decision-making process
- *Public participation* mechanisms to provide platform to engage with institutions opinion leaders, implementation partners, and the general public
- A *phased multi-media communications programme* to increase knowledge on the project and to increase public support for DHP and such projects in future
- *Communications capacity strengthening* of DHP team and/or partners to implement the Communications Strategy

14. The following matrix lays out key aspects of intervention on each of the above areas.

Strategy 1 – internal communications

Audience	Key Message Themes	Methodologies	Tools and Channels	Outcome Indicators	Partners
Internal Staff	Benefits and opportunities created by DHP. Expectations of the Dasu Hydropower Project from prospective and present employees. Roles and mandates of donor organisation (s), and implementing contractor (s).	Reach staff members through established and informal communications systems. Utilize team briefing methods. Piggyback on existing forums, e.g. the bi-monthly meetings Orientation and training;	Staff briefing kits;, social/environ-ment safeguards. Quarterly information bulletin on progress of the project;	Reduced staff concerns about institutional changes and enhanced shared vision and clarity about the DHP implementation Increase in knowledge and support on among staff	Dasu Hydropower Project team, WAPDA, World Bank, any other donor(s), Implementing Contractors

Strategy 2 – timely provision of project information

Audience	Key Message Themes	Methodologies	Tools and Channels	Outcome Indicators	Partners
People/residents of those 34 villages directly affected by the construction of Dasu Dam Local communities around the project site General public of District	The project is beneficial for the local communities and for the people of Pakistan. It will bring development to the project area while for people of Pakistan , it will generate energy; Implementation is transparent and project implementers want to share project information with the communities	Information dissemination to communities on implementation, status, and progress of the project Seeking communities' feedback on the implementation issues including resettlement, compensation, environmental, and issues and solutions related	Village heads (*maliks*) and religious leaders (Imams), and other Local Committees Hydropower Information and Communications Unit Mobile phones District Administration	Local Community more informed about the project; People in the project area are satisfied with the information dissemination. They have better understanding on project benefits	Local Communities District Administration *maliks* and Imams of 35 Villages,others Departments of Social Welfare, Health, Education, and others

Upper Kohistan	Project implementers require your opinion on solution of issues	to livelihood in the project area	Notice Boards	They have more trust on the implementation agency	

Strategy 3 - public participation mechanisms

Audience	Key Message Themes	Methodologies	Tools and Channels	Outcome Indicators	Partners
Opinion leaders at the national, regional and local levels	Contribution of Dasu Hydropower Project to national development. .Invitation to support implementation of DHP and such initiative in future as progressive leaders. .Value of good management of hydropower resources for the nation and for each business and household.	Disseminate information through focal points within their organizations on energy requirements of the country. Establish "energy forums" to engage and promote public participation at the national, regional and local level Facilitate opinion leaders to reach out to their communities with energy issues by providing communications support .	Briefing materials. Seminars and workshops. Energy forums. Organizational meetings. Articles in sector publications. Quarterly progress newsletter.	Discussions by opinion leaders are increasingly based on correct knowledge of the DHP, its benefits, impact, and outcomes. Increase in knowledge of DHP among policy and decision makers. Functional public participation mechanisms established Increase in number of community and civil society initiatives in support of DHP	NGOs active in the water and power sector. Parliamentarians at provincial and national levels and key government ministries. Development partners. Provincial/Local/District administration.

Strategy 4 - multi□media communications programme

Audience	Key Message Themes	Methodologies	Tools and Channels	Outcome Indicators	Partners
General Public (District Upper Kohistan and adjacent districts specially, and KP and at national level in general). Urban, rural settlements Service	Benefits of DHP. Roles of WAPDA and DHP team to address energy crisis. Improved delivery through better governance and management. Value of good	Raise awareness through six-month branded multi-media campaign delivered utilizing both paid-for advertisement and non-paid media initiatives. Reinforce campaign messages by mobilizing NGOs, CBOs, and government departments to disseminate information materials	Print, editorials, newspapers. Radio infomercials. Posters, brochures, bumper stickers. Radio and TV discussion programmes. News and	Increase levels of awareness among adult population within the first six months. Increase in quality of knowledge on DHP.	Media organizations. Communications organisations and agencies. NGOs. Other related ministries. Local authorities. Provincial

providers Women and youth	management of water and hydro resources for the nation, and its people	to communities within their reach.	feature articles. Community meetings.		administration.

Strategy 5 - communication capacity strengthening

Audience	Methodologies	Tools and Channels	Outcome Indicators	Partners
Dasu Hydropower Project and other partner organisation (s) in implementation of the Communications Strategy	Orientate WAPDA PRD to Dasu Strategy; Set up a communications unit to implement the strategy; DHP to hire comm. staff Provide TA and training to implementers; Monitor and evaluate the specific plans developed and provide feedback.	Workshops and seminars. Technical assistance. "How To" Guides and Manuals. Communications planning templates. Field visits and study tours. An international standard website on the project	The project has established a Hydropower Information and Communications Unit; Increased communications capacity within sector institutions.	Selected agency/organisation/ company to implement the Comm. Strategy. Communications training institution WAPDA's Public Relations Division

Annex 10: Preliminary Summary of Indicative Terms and Conditions of the Proposed IDA Guarantee[37]

Dasu Hydropower Stage-I Project

This term sheet contains a preliminary general summary of indicative terms and conditions of a potential IDA Partial Credit Guarantee (the Guarantee) for a private sector financing to be contracted by [WAPDA]. These terms would be subject to further development based on, among other matters, [WAPDA]'s choice of underlying financing arrangements and decisions on the structure of the proposed Guarantee. This term sheet is for discussion purposes only and does not constitute an offer to provide a Guarantee. The provision of a Guarantee is subject, inter alia*, to satisfactory appraisal of the operation by the World Bank, further consideration, selection, review and acceptance of the underlying financial structure and transaction documentation by the World Bank, compliance with all applicable policies of the World Bank, and the approval of the management and Executive Directors of the World Bank in their sole discretion. All terms and conditions herein are subject to change and/or additional terms and conditions may apply.*

Borrower:	[Water & Power Development Authority (WAPDA)/ or Islamic Republic of Pakistan (Pakistan)]
Use of proceeds:	The proceeds of the guaranteed facility will be used by WAPDA [or Pakistan] exclusively for the purposes of financing [eighty-five percent] of the payments under the [EPC Contract(s)] for the DASU Hydropower Station
Financing currency:	[US$]
Financing amount:	[Up to US$ 2,446 million]
Maximum IDA Liability:	Up to [US$ 460 million]
Final maturity:	Subject to the continuing availability of the IDA Guarantee, [20] years from financial closing
Choice of law:	**[**England] [New York]
Guarantees:	**[Government Guarantee**. [The Government will guarantee to the [Agent on behalf of the lenders], the timely payment of all of the Borrower's obligations in respect of the financing][38] **IDA Guarantee**. [IDA will guarantee the [Agent on behalf of the lenders], the timely payment of [amounts and structure of coverage to be decided], falling due and payable by the Borrower, but not paid by the Borrower [nor paid under the Government Guarantee], as further described below, and in accordance with the mechanics and terms set out in the Guarantee Agreement

[37] As part of Board approval a waiver of OP 14.25, *Guarantees*, paragraph 3 is sought for an IDA PCG of US$460 for commercial financing and export credits. This PCG would cover Component A (US$1,479.7 million) and Component B (US$1,397.8 million). OP 14.25, paragraph 3, currently limits IDA guarantees to only partial risk structures. It does not allow IDA to issue PCGs, such as the one proposed under the Project. On December 3, 2013, the Board approved Management's proposed reforms to fully integrate the Bank's policy on guarantees with those on investment project financing and development policy lending, in order to support a fuller use of Bank guarantees in its client countries and leverage its resources more effectively to deliver critical infrastructure. The restriction contained in OP 14.25, paragraph 3, has been eliminated under the revised OP 10.00, *Investment Project Financing*, which makes all types of guarantees available to IDA countries (under certain fiscal considerations) and eliminates the distinction between PCGs and PRGs. The revised OP/BP 10.00 will come into force on July 1, 2014, after approval from the Board has been sought for this Project. Management endorses the request to the Board for a waiver of OP 14.25, paragraph 3, to allow IDA to issue the PCG proposed under the Project.

[38] Will only be needed if WAPDA is the Borrower

IDA Guarantee Fee:	The Borrower will pay to IDA a Guarantee Fee of [0.75 percent per annum] on the *present value* of the Maximum IDA Liability, payable [on each fee payment date in advance of each fee period against the average balance of the present value for such a fee period [upfront][39]

Other provisions related to IDA's policy and legal requirements for guarantees:

Subrogation:	If IDA makes a payment under the Guarantee, IDA would be entitled to stand in the place of the lenders and exercise the rights of such lenders to seek reimbursement for amounts paid by IDA.
Amendments and waivers:	IDA will be entitled to be kept fully informed about any proposed waiver or amendment to the terms of the transaction. Certain amendments or waivers to the provisions of the finance documentation and guarantee, insofar as they relate to the Guarantee, requires the prior written consent of IDA, including, but not limited to, any material amendment or modification to a finance document or any amendment or waiver that materially and adversely affects the rights and obligations of IDA.
Suspension:	IDA may, during the availability period for drawdown of the guaranteed financing, inform the [Agent] that no further drawdown of the guaranteed financing, from the date of notification by IDA up until such notice is revoked by IDA, will be covered by the Guarantee upon the occurrence of the following types of scenarios, *inter alia*: (i) an event of default occurs under the guaranteed financing; (ii) [WAPDA] has breached a material obligation under the Project Agreement and such breach continues after any applicable cure period; or (iii) the [Agent] or a beneficiary of the Guarantee engaged in certain sanctionable practices (fraud, corruption, coercion, collusion, obstruction) relating to the guaranteed financing. If the event giving rise to a suspension has been waived by IDA, or remedied to IDA's satisfaction, then IDA may revoke its suspension notice and let the [Agent] know which amounts are reinstated for coverage under the Guarantee][40].
Exclusion:	IDA may deny payment to a beneficiary of the Guarantee in the following types of scenarios, *inter alia*: (i) a sanctionable practice (fraud, corruption, coercion, collusion, obstruction) has been found to have been committed by the [Agent] or a beneficiary of the Guarantee; (ii) the [Agent] or a beneficiary of the Guarantee, *inter alia*, amends the guaranteed financing documents, or transfers, or assigns the financing to a non-commercial lender[41] without IDA's prior written consent; (iii) the [Agent] or a beneficiary under the Guarantee engages in Repackaging Arrangements in respect of the Guarantee.
Repackaging Arrangements:	The lenders will severally undertake for the benefit of IDA that, provided the Guarantee remains in effect, they will not enter into or permit any of their

[39] Fee payment method (upfront or on each fee payment date) to be chosen by [WAPDA]. For clarity, fee payment dates are expected to coincide with interest payment dates for the guaranteed financing.

[40] This clause would only be applicable if there were expected to be multiple disbursements of the financing (that is, if there were to be an availability period for drawdowns).

[41] Except as IDA may otherwise agree, assignments or transfers of the IDA-guaranteed financing may only be to an entity established as a bank or financial institution duly licensed to carry out banking or financial business in its country of domicile. Such assignee may be a partly or wholly government-owned institution, but cannot be an export credit agency, multilateral institution or state entity. Such assignee must not have been declared ineligible to be awarded an IBRD- or IDA-financed contract in accordance with World Bank Sanctions Procedures and must not be an entity included on the consolidated list of individuals and entities maintained by the United Nations Security Council Committee established pursuant to United Nations Security Council Resolution 1267.

	affiliates to enter into any arrangement pursuant to which any security or other similar obligation is created or issued, the economic effect of which is the separation of rights of payment from IDA under the Guarantee and of rights of payments from [WAPDA] under the financing, which is referred to as "Repackaging Arrangements".
IDA Obligations Binding:	IDA's obligations under the Guarantee shall be binding upon IDA and remain in full force and effect until payment in full of the obligations of IDA under the Guarantee or termination of the Guarantee, as the case may be, provided that the obligations of IDA under the Guarantee shall not be treated as a separate obligation of IDA independent from the amount guaranteed.
Termination:	IDA may terminate the Guarantee in the following types of scenarios: (i) untrue statements are made by the [Agent] or a beneficiary of the Guarantee in connection with a demand made under the Guarantee; (ii) the IDA Guarantee Fee is not paid; or (iii) the Guarantee is otherwise terminated due to full repayment of guaranteed amounts.
No Discharge:	Neither the obligations of IDA under the Guarantee nor the rights, powers and remedies conferred upon the [Agent] with respect to IDA by the Guarantee or by applicable law or regulation shall be discharged, impaired or otherwise affected by: (i) any insolvency, moratorium or reorganization of debts of or relating to [WAPDA]; (ii) any of the obligations of [WAPDA] under the financing agreements being or becoming illegal, invalid, unenforceable, void, voidable or ineffective in any respect; (iii) any time or other indulgence being granted to [WAPDA] in respect of its obligations under the financing agreements; or (iv) any other act, event or omission (other than the failure of the [Agent] to make a timely and duly completed demand under the Guarantee) which might otherwise operate to discharge, impair or otherwise affect any of the obligations of IDA under the Guarantee or any of the rights, powers or remedies conferred on the [Agent] by the Guarantee or by applicable law or regulation.
Reduction of Demand:	If, after the [Agent] has made a demand on IDA for payment under the Guarantee, but before IDA has made payment of the amount so demanded, the [Agent] receives payment in respect of such amount from [WAPDA] or Pakistan (or the [Agent] recovers otherwise than from IDA) any sum which is applied to the satisfaction of the whole or any part of such amount, the [Agent] shall promptly notify IDA of such fact and IDA's liability under the Guarantee in respect of such demand shall be reduced by an amount equal to the portion so paid by [WAPDA] or Pakistan (or so recovered by the [Agent]) and so applied.
[**Offer to Purchase**:	Pursuant to its Articles, IDA will have the right upon default by [WAPDA] on any guaranteed debt service payment obligations, to offer to purchase the underlying guaranteed debt at par plus accrued and unpaid interest. Any such offer may be accepted or declined at the option of the lenders.]
Conditions Precedent:	Usual and customary conditions for financing of this type, including the following: (a) Provision of relevant legal opinions satisfactory to IDA (including a legal opinion from the Minister of Justice of Pakistan and a legal opinion from a duly authorized official of [WAPDA]); b) Payment in full of the[first installment of the] Guarantee Fee; and c) Conclusion of a Project Agreement between [WAPDA] and IDA, an Indemnity Agreement between IDA and Pakistan, a [Guaranteed

	Financing Agreement] among the [Agent], Lender[s], [WAPDA] and IDA, and any other applicable documentation.
[Consents:	All necessary market and currency consents will be obtained prior to effectiveness.]
Indemnity:	The Islamic Republic of Pakistan will enter into an Indemnity Agreement with IDA in respect of the Guarantee. Under the agreement, Pakistan will undertake to reimburse and indemnify IDA on demand, or as IDA may otherwise direct, for all payments under the Guarantee and all losses, damages, costs, and expenses incurred by IDA relating to or arising from the Guarantee. Any obligation by Pakistan to reimburse IDA for payments made under the Guarantee will rank *pari passu* with all other external indebtedness of Pakistan, including external indebtedness of Pakistan to IDA.
Project Agreement:	Agreement between [WAPDA] and IDA with respect to implementation of the operation setting out the requirements on institutional arrangements, use of proceeds, etc.
Supplemental Letters:	Supplemental Letters from [WAPDA] and Pakistan, as applicable, to IDA substantially similar to those in IDA lending operations: (i) letter from Pakistan regarding provision of economic and financial data, (ii) letter from [WAPDA] containing certain representations, and (iii) letter from [WAPDA] regarding performance indicators.

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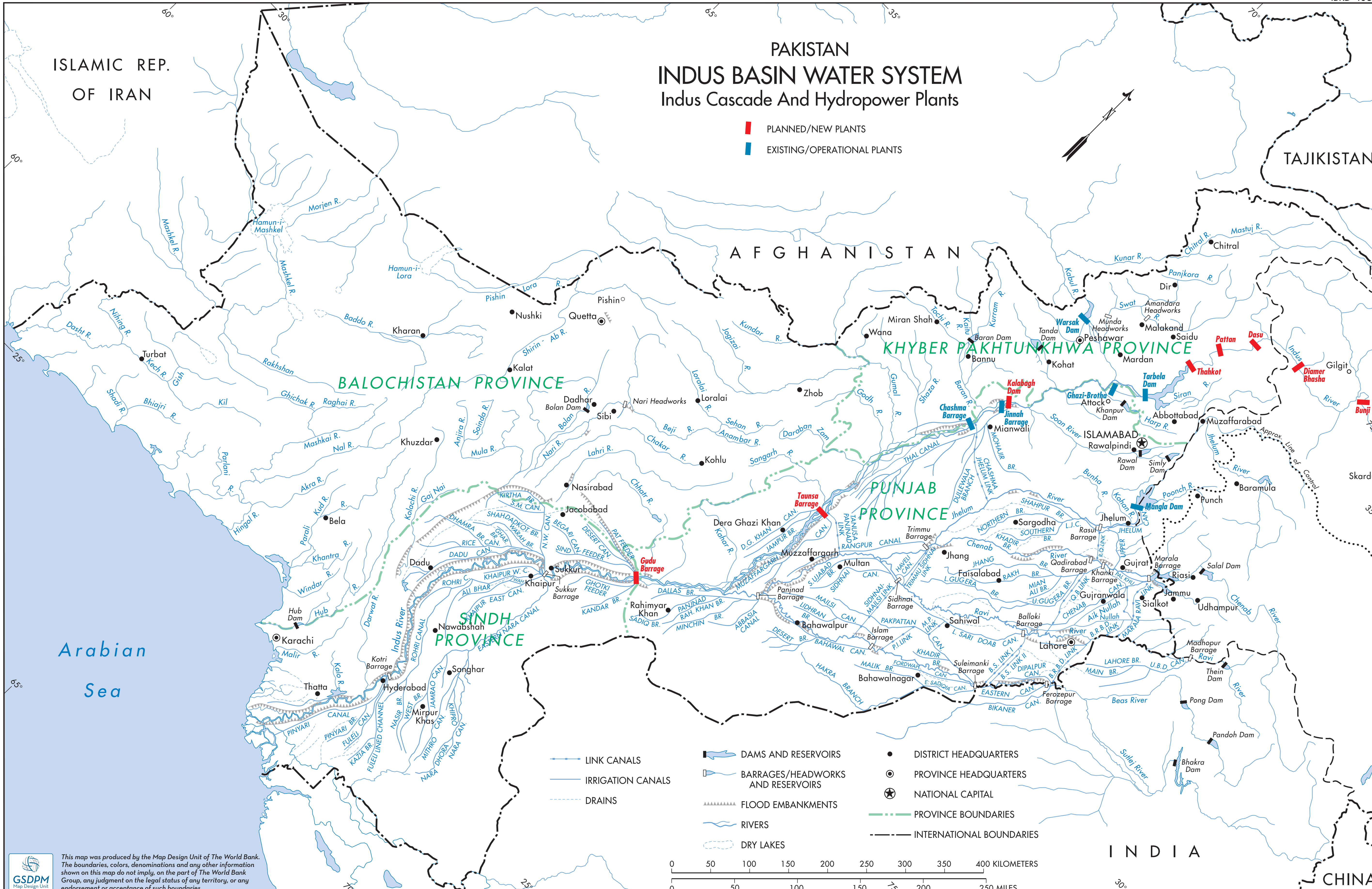

SEPTEMBER 2013