



FEASIBILITY STUDY GUIDELINES

**Pakhtunkhwa Energy Development Organization
(PEDO) Energy and Power Department, KP**

Prepared by
Pakhtunkhwa Energy Development Organization

Feasibility Study Guidelines

Volume I		Main Report
	1	Project Overview
		Project Summary (short description of the proposed project)
		Background: reasons for this project, expected benefits
		short description of the tasks and targets of the feasibility study
		Stakeholders:
		- donor
		- client
		- Implementor (responsible organization for planning and implementation of the power plant (consultant, NGO)
		- subcontractors (name of the companies or individuals and their scope of work)
		- beneficiaries (villages or communities and their representatives)
	2	Physical Conditions for Project Development
		Summary of Vol. II Geology and geotechnical conditions
		Summary of Vol. III Hydrology and sedimentology
		Short description of methods used for normal discharge and high flood assessment.
		Flow duration curve (chart and figures)
		Existing road network and accessibility
		Existing communication facilities
		Existing electrical grid and power supply
		Electricity tariffs
		Electricity demand in a short, medium and long term view
	3	Assessment of Layout Alternatives
		Short description of assessment of the layout (technical - social)
		optional: comparison of studied alternatives
		optional: rejected alternatives and reasons thereof
	4	Civil and Hydraulic Engineering Design
		Project layout (text complementary to the drawings)
		Description of main civil and hydraulic structures in particular
		overall hydraulic concept
		sediment management
		floating debris management
		flood protection concept (intake, headrace structures)
		penstock: hydraulic dimensioning and static concept
		power house and machinery: spatial concept, static concept
	5	Design of Mechanical Equipment
		Selection of turbines
		Selection of generators
		Flywheels, transmission, gearings
	Lifting device powerhouse (if any)	

Volume I	6	Design of Electrical Equipment
		Description of the control system and main components
		Description of load and/or discharge control
		Main measuring devices
		Transmission and distribution
	7	Design of Hydraulic Steel Structures
	8	Power and Energy Potential Study
		Potential power production (for each month)
		Power demand: daily load curve (for each month)
		Conclusion: Estimated power sold / power deficits
	9	Cost Estimates
		Project Cost
		Construction Cost (based on Annex A5)
		- civil works
		- hydraulic steel works
		- mechanical equipment
		- control system
		- electrical equipment
		- power distribution (switchgear, transformers, transmission lines)
		Cost for Engineering, Survey and Site Supervision
		Other project development cost (client's expenses, insurance, IDC, ...)
		Summary of total Project Cost
		Operation Cost
		staff cost
		capital cost, if any (interest, amortization)
		cost for repairing and replacement
		Cost for plant and/or grid extension (if any)
		assessment of possible plant or grid extension cost
		assessment of timelines for such extensions
	10	Project Implementation
		Milestones, timelines (technical, social, financial, contractual)
		Construction Program (eventually to shift into Annex)
	11	Economic and financial Analysis
		Input parameters (from previous chapters):
		- annual energy production, tariffs and gross revenues
		- amortization period and interest rate for invested money (if any)
	- annual operation cost	
	- total annual cost	
	Calculation of:	
	- NPV value of present project and future extension cost	
	Results:	
	- NPV value of present project and future extension cost	
	- average specific generation cost (Rupees/kWh)	
	- recommendation for power tariffs	
12	Social and Environmental Impact Assessment	
	Main conclusions from the Initial Environmental Examination (IEE) Volume V	

Volume I		chapters 1 and 3 to 6 from Appendix I "Summary of IEE Report"
		Annex
	A1	Standardized Project Data Sheet (see attached "Standardized project Data Sheet")
	A2	Acronyms
	A3	Units (cusec, CMS, etc.)
	A4	Hydraulic calculations (intake / headrace / penstock / tailrace parts ...)
	A5	Cost calculation for civil structures
		Bill of Quantities and unit rates for civil structures
		Excavation works (soil, rock)
		Masonry, dry wall, gabion works
		Concrete works
		Construction steel
		Penstock
A6	Cost calculation for hydraulic steel works	
Volume II		Geology and Geotechnical Conditions
		It's up to the implementor to decide how far and by which means geology and geotechnical conditions have to be scrutinized
		If such investigations are considered not to be necessary for certain locations or even for the whole project area, the implementor has to describe the reasons.
		Geological / geotechnical investigations are compulsory in case of a tunnel or a cavern. Geotechnical investigations are compulsory in case of a weir with firm body and/or movable gate
Volume III		Hydrology and Sedimentology
		Catchment Area
		Climate Data, Precipitation in comparison with bigger area (Province)
		Regular river runoff
		description of hydrological methods for regular river runoff assessment
		Mean Annual Flow
		Normal Average Flow – Wet season
		Normal Average Flow – Dry season
		High Flood
		description of hydrological methods for high flood assessment
		20y flood event
		100y flood event
		PMF
		Sediments
		description of methods for sediment load assessment
		sediment load during dry season
	sediment load during wet season	
Volume IV		Topography and Accessibility
		Existing topographical data
		description of topographical survey
		produced maps of the project area
Volume V		Initial Environmental Examination (according General Guidelines)
	0	Executive Summary

	1	Introduction
	2	Description of the Project
	3	description of Environment
	4	Screening of Potential Environmental Impacts and Mitigation Measures
	5	Environmental Monitoring Programme and Institutional Requirements
	6	Conclusions
		Appendix I : Summary of IEE Project
		Appendix II: C Environmental Guidelines for selected industrial and power development projects?
Volume VI		Drawings
		<i>all drawings need to show</i> - drawing title - the scale - drawing number - date - name of draftsman - name of approving person
		<i>File name = Drawing number_drawing title.pdf</i>
		General Layout
		Hydraulic longitudinal profile of headrace structures from river at the intake to the forebay for the following cases: - regular operation, turbine full supply operation - regular operation, turbine closed - high flood
		Intake (layout, longitudinal and cross sections)
		Headrace channel (layout, typical cross sections)
		Gravel trap (layout, longitudinal and cross sections)
		Sand trap (layout, longitudinal and cross sections)
		Forebay (layout, longitudinal and cross sections)
		Spillway (layout, longitudinal and cross sections)
		other important headrace structures, if any
		penstock (layout, longitudinal and cross sections)
		power house (layout, longitudinal and cross sections)
		power house underground structures (layout, longitudinal and cross sections)
		tailrace channel
		switchyard (if any)
		transmission and distribution grid