DETAILED DESIGN GUIDELINES

Pakhtunkhwa Energy Development Organization

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Prepared by

Pakhtunkhwa Energy Development Organization

Detailed Design Guidelines

Volume I		**Main Report**
	1	Project Overview
		Project Summary (short description of the proposed project)
		Summary of Section 2, 3 and 8 from feasibility report
	2	Civil and Hydraulic Engineering Design (update of feasibility report)
		Main changes compared to the Feasibility Report
		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
	3	Design of Mechanical Equipment
		Selection of turbines
		Selection of generators
		Flywheels, transmission, gearings
		Lifting device powerhouse (if any)
	4	Control system
		Description of the control system and main components
		Description of load and/or discharge control
		Main measuring devices
	5	Design of Electrical Equipment
		Specification of transformer, switches, HV- and LV components
	6	Design Transmission and distribution system
		Concept (update of feasibility study)
		design of pole cables etc.
		specification of electrical gear
	7	Design of Hydraulic Steel Structures
		Update of feasibility study
	8	Cost Estimates (update of feasibility report, if any)
		Project Cost
		Construction Cost (based on Annex A5)
		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

Volume I		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
	9	Project Implementation (update of feasibility report)
		Milestones, timelines (technical, social, financial, contractual)
		Construction Program (eventually to shift into Annex)
	10	Economic and financial Analysis (update of feasibility report, if any)
		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
		Annex
	A1	Updated standardized Project Data Sheet
	A2	Acronyms
	A3	Units (cusec, CMS, etc.)
	A4	Hydraulic calculations (intake / headrace / penstock / tailrace parts …)
	A5	Cost calculation (update of feasibility study)
		Bill of Quantities and unit rates for civil structures
		Excavation works (soil, rock)
		Masonry, dry wall, gabion works
		Concrete works
		Construction steel
		Penstock
		Cost for hydraulic steel works
		Cost for electromechanical, electrical part and control system
		Cost for T&D
		Cost for Engineering, Survey, Site Supervision and experts
		General Cost like land acquisition, insurance, IDC, etc.
Volume II		**Geology and Geotechnical Conditions**
		in case of important amendments only
Volume III		**Drawings**
		all drawings need to show *- drawing title* *- the scale* *- drawing number* *- date*

		- name of draftsman *- name of approving person*
Volume III		*all drawings need to show* *- drawing title* *- the scale* *- drawing number* *- date* *- name of draftsman* *- name of approving person*
		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