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DATA FOR DUE DILIGENCE STEP 2

KURRAM TANGI DAM PROJECT

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KURRAM TANGI DAM PROJECT

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Kurram Tangi Dam Project Data for Due Diligence Step 2

I conducted visit of WAPDA House Lahore on June 3 and 4 and met, Project Team comprising Mr. Irshad (GM P&D), MR. Shahid Hamid Director Dams, Mr. Sher Zaman Project Director Kurram Tangi Dam Project. I also held in depth discussions with Project Constantans(PES) comprising Mr. Suhail Anwar Director PES, Mr. Dr. Nawaz in charge Environmental Impact Assessment (EIA)/ Resettlement Action Plan(RAP),representatives of Geotechnical investigation and hydrology and sedimentation who had completed feasibility study and detailed Engineering design of the project. I also discuss P&I team who have carried field investigation i.e. top survey, geotechnical studies of the project area during Pre- feasibility, feasibility study and later during detailed engineering design of the project.

Details of the discussions, comments and conclusions are as under:

1.0 FIELD INVESTIGATION:

1.1 Topo Surveying: Top survey of Dam site. Reservoir Areas, Kurram Tangi Weir site, Katui River Weir. Topographic and Mapping Faisalabad Division of P&I WAPDA have carried Canal sytems,remodeling of existing Canal System, Power House area and other structure under the supervision of Pakistan Engineering Services(PES)…. the Project Consultants.

1.2 Hydrology & Sedimentation: Kurram Tangi Dam is basically dam for storage of annual flows from Kurram Tangi and subsequent releases from Kaitu River. Thus this store water will be released into Kurram Tangi Head works located 25 Km downstream of dam and further release to newly proposed Thal canal and existing Marawat canal and Civil Canal in district Bannu.

Kaitu River is right bank tributary of Kurram Tangi. It has 141 Km long perennial flows and joined Kurram River 1.6 Km north of Zarwam village. The catchment area of Kurram and Kaitu rivers lies partly in Afghanistan and partially in Pakistan.

Major source of water both for Kurram and Kaitu is rain fall.Avrage rain fall of the 3 climatic stations recorded from 1970-2000 are as under:

Bannu 332 mm. Lockhart 849 mm. Parachinar 795 mm.However rain data of catchment located in Afghanistan is not taken in to consideration being unavailable.

There is no flow recording gauging station on Kurram Dam site. Presently Gauging Stations are installed in following three locations:

- Kurram Tangi Head works, by NWFP since 1958.
- Thal Gauge Station, 16 Km downstream of dam site by SWHP of WAPDA since 1968.
- Kaitu River at Spinwam, by NWFP since 1979.

Based on these recorded flows, the Project Consultants have calculated annual availability of water as under:

Average Annual flows at Kurram Tangi head works = 1116 Th.AF. Annual diversion from Kaitu river to KTD dam = 205 Th.AF. Annual inflows to Kurram Tangi Dam =908 Th.AF. Annual Flows at KGHW post KTD =209 Th.AF. Run off generation for Barn Reservoir = 20 Th.AF

1.3 Sedimentation: The Consultants have carried in depth studies on sediment flow, bed load and bed material in Kurram River and have estimated cumulative sediments volumes deposited in Kurram Tangi Dam as following:

T (years)	25	50	75	100	125	150	175	200	225	250
Sediment Volume	89	176	262	347	431	514	596	677	757	834

Based on the study the consultants have assumed the effective life of reservoir more than 225 years.

Surface Water & hydrology (SWH) department of WAPDA and NWFP irrigation Department were recording the Gauging Stations data whereas PES Consultant has analysised water and sedimentation data.

1.4 Geological Mapping : Geological Mapping of Dam Area, Kurram Tangi Weir site, Kaitu Weirs , New Canal System, Existing Canal System was carried by Pakistan Engineering Services by conducting field trips collecting and evaluation of the data of project area.

Pakistan Engineering Services Geologist has carried Geological Mapping of Project Area. The Consultants have also taken information's from Geological Departments of FATA Development Corporation, Peshawar University and Geological Survey of Pakistan.

1.5 Boreholes: The following Boreholes were drilled using Diamond core drilling of NX and NQ size at following different locations according to site conditions. P&I Division of WAPDA under close supervision of Pakistan Engineering Services (PES) have drilled all boreholes and test pits.

Dam Area: 12 Nos bore hole were drilled during Pre Feasibility study and 13 Nos Boreholes were drilled during feasibility stage.

Kurram Tangi Weir: 2 Nos bore holes, Power House NO 1 No Borehole

Power Tunnel: 3 Nos boreholes, Power House No 2 one borehole, Weir for Power House No 3: three

Power House No 3: one Borehole, Kaitu Weir which is mostly overburdening three boreholes, two boreholes on river channel and one borehole on right abutment.

KAITU Feeder Tunnel Mostly on overburden 3 Nos each of 125ft depth.

EXPLATORY ADITS: 2 NOS Test Pits were also carried from dam area by P&I division.

1.5.1 Testing Of Samples: Total 61 selected rock core samples were tested during Pre Feasibility and 55 selected core samples were tested during Feasibility studies in Central Material Testing Laboratory(CMTL) of WAPDA. 4 Samples from the areas for fine aggregate (Sand) and 3 samples from the areas for coarse aggregate were investigated for Construction material. 18 sources were studied for water suitability.

1.6 Seismic Studies: a specialized firm M/S Earth Technologies of Lahore having qualified engineers, geophysicists and seismologist were involved for carrying seismic-tectonic studies for Kurram Tangi Dam Project.

1.7 Hydraulic Model Studies: Hydraulic model test studies of the project were carried by Irrigation Research Institute (IRI) of Irrigation Department Punjab located at Nandipur. The test model developed includes independent physical model for (!) Main Dam tunnel and Spillway (!!) Kaitu River Weir and its associated structure

Comments: Details of Bore holes are provided in the report and results of Bore Logs and Core material tested in the laboratory are presented in the Report. Mostly sub soil classification is sand stone whereas overburden of loose clay/gravel of about 20 ft is appearing all along tunnel area and power house no 3.General sub soil conditions are favorable for 322ft dam.

2.0 POWER SECTOR:

Five Power Houses with total installed Capacity of 83.4 MW of 332 Gwh of energy annually.

- Power House No 1 36.5 MW
- Power House No 2 11 MW
- Power House No 3 17 MW
- Power House NO 4 18.5 MW
- Power House No 5 .4 MW
- Total 83.4 MW

In the Feasibility Report only three Power Houses with installed capacity of 62.9 MW with annual energy of 317.2 Gwh are described. Two power houses are added during detailed engineering design of the project. All required data and technical specifications of E&M equipment have been added under chapter 9 of detailed Engineering Report. A 35 Km, 132 KV interconnection is proposed from power house No 1 linking power house No 2,3 and 4 through 132 KV interconnection and onward transmission to 220/132 KV Domail (Bannu)

3.0 ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

Kurram Dam project is multipurpose water resources development project spread in almost 200 sq.Km.The project area constitutes one of the most backward region of Pakistan and is vital importance for the uplift of area in term of economy, infrastructure, awareness and improved standard of living. Existing engineering complex i.e. head work, irrigation canal system have proved to play significant role for improvement of socio economic benefits of project area though in minimum. Comparing this the new project development i.e. Kurram tangi dam,Weirs,new irrigation canals, remodeling of existing canals and 84 MW power supply will give much more economic benefits and socio economies conditions except displacement of some population from reservoir area.

Comprehensive on and off field investigation have been made by the Consultants interm of effected land, classification of land, existing pattern of agricultural uses of the land, availability and use of water for irrigation, efficiency of corps production, displacement of population and infrastructure, mitigation of displaced population, availability of water resources after completion of Kurram Tangi Complex, efficiency and improvement of corps with additional availability of water and its impact on socio economic life of area.PES Environmental Cell have carried all EIA and RAP under Dr. Nawaz.

Kurram Tangi Dam Project is complex development consisting of five independent features:

1. Main dam,spillway,reservoir Diversion tunnels and associated structures
2. Kaitu River Weir, tunnel and structure
3. Kurram Tangi Head works, remodeling of Marawat and civil canal
4. New irrigation Canals for Thal plains, Sheratala and Ragha Spaira plains
5. 5 Power Houses and 132 Kv transmission line up to Domail and 220Kv/132Kv Interconnection at Bannu Grid
   The complex is spread over in North WaziristanAgency, FR Bannu, Districts of Bannu, Karak and Lakki Murawat.

Major displacement of Population comes out from the reservoir area (11000) and from the other areas about 2000 people. In addition to above the following infrastructure (based on 2004 data) need to be relocated:

A. Dislocation of Privately owned infrastructure consisting of 142 cattle sheds, 266 wells & 47 water courses
B. Public infrastructure effected :
    - 8 Km Mir Ali- Thal roads will be submerged in the reservoir area.
    - 4 Km metal led road off taking from Mirali-Thal to dam site will be Submerged.
C. Social Infrastructure:
        - 22 Nos Primary Schools male with Students 699
        - 7 Nos Primary shool Female with students 307
        - 4Nos Middle Schools male with Students 640
        - 4Nos High School male with students 786
        - Vocational training centre 1 No
        - 3 Nos Madrasa with students 840
        - 3 Nos Privatehigh/Middle School with students 1150
        - One Civil Hospital 8 bedded
        - 2 Nos BHU with 2 Medical officer
        - 2 Nos MCH centres
        - 3 Nos Animal husbadary Clinics

WAPDA accordingly have prepared Master Resettlement Action Plan on 394.5 acres. Initially Consultant had proposed 3 location were selected i.e. Spaira Ragha, Sheratalla plains and areas on left side of the dam. Areas on left side of Dam are now selected to settle the effected population. The proposed master plan consists of 1000 Nos plots ranging from 1 to 4 kanals for each family, civic facilities such as primary & high schools, basic health units Masques, Park/Play grounds commercial centres,Grave yards and area reserved for services. Map showing Master Plan is Annex 1.

Eight Km Mir Ali- Thal roads submerged in the reservoir area and 4 Km metal led road off taking from Mirali-Thal to dam site will be relocated during construction of Kurram tangi Dam Project.

Land Effected For Kurram Tangi Complex: The following is position of state and private land affected in project area:

3. **STATUS OF LAND REQUIREMENT**

Components	Land Requirement in Acres	Total
Storage Area	Private =9424 State Own= 1576	11000
New Canals:		
Thal canal	Private = 1716,	1716
Sheratalla Canal	Private =397	397
Spaira Ragha Canal	Private =147	147
Main Dam & associated Structure including Power Houses	State Own =600	600
Weir on Kaitu River	State Own = 400	400
Resettlement Area	Private = 500	500
TOTAL	Private = 12224 State Own = 2576	14800

Out of 14,800 acres land required for the project so far only 210 acres of land have been acquired whereas measurement of 560 acres completed due to no provision in PSDP.

5.0 SELECTION OF PROJECT CONSULTANTS

Mott-Mc Donald of UK in association with MMP (Pakistan) and PES have been selected as a Project Consultant for the project. Signing of Consultancy agreement said to be on 16.6.2011. Time being the documents is with WAPDA Central Contract Cell for review. All project activities are handled by General Manager (P&D) WAPDA, WAPDA House Lahore.

Scope of Services for the Project Consultant is as under:

5.1 CIVIL WORKS:

5.1.1 Review of Previous Design:

- Which includes review of previous Design, review of Tender Drawing/Design

5.1.2 Provide Final Design

- Which includes preparation of Design Report, preparation of Construction Drawings and as built Drawings?
- Assist WAPDA for Selection of EPC Contractors including invitation of tenders, receipt of tenders, evaluation of tenders and obtaining approval from WAPDA authorities as per procedure.

5.2.0 Construction Supervision

- which includes contract management, monthly progress reports, contractor monthly payments, monitor contractor day to day progress, prepare variation orders recommendation on variation orders, update cost 6 monthly basis prepare O& M manuals and prepare completion drawings.

5.3 E& M WORKS:

- The consultant will review design of all electrical and Mechanical equipment including drawings and suggest amendment as required.
- Supervise the installation of electrical and mechanical equipment in satisfactory and safe manners in accordance with the specification and contract provisions.
- Recommend payments in accordance of contract provisions.
- Monitor and coordinate the supply of E&M equipment in line civil work schedule for smooth and timely completion of project
- Prepare variation orders as required under provisions of contract.
- Provide recommendation on contractors Claims as per contract.

COMMENTS: the scope of Services for the Project Consultant is realistic.However; there is no room to adjust any major changes in the design by the selected Consultants

6.0 PLAN OF IMPLEMENTATION

- Appointment of Consultant ASAP Expected 16.6.2011.
- Finalization of Tender Documents 6 weeks after item 1 6
- Invitation of Bids on completion of item 2 above 6
- Receipt of Bids 3 months after item 3 above 19
- Evaluation, Negotiation and Award 2 months 27
- Construction of Project 4 years

COMMENTS: The Schedule is already out of the target. At least one year delaying within the prevailing conditions.

7.0 RISKS & ISSUES

7.1 SECURITY:

Originally WAPDA had prepared following security plan:

- Mobilization of 1500 security personnel.
- Arrangement of 130 Vehicles for security staff
- Provision of $ 40 Million for the above 2 items.

WAPDA has changed the Concept and now instead of providing security by WAPDA, security will be the responsibility of contractor for his staff and construction equipment.

7.2 POLITICAL:

Still no work started on following Pre-Construction activities which may delay the project by at least one year.

Displacement of 13000 Population from Reservoir as well as other Areas

Community mobilization, Public Awareness and timely acquiring of Land for mobilization of Contractor team for construction.

7.3 RESETTLEMENT

Displacement of 13000 people and WAPDA Master Resettlement are not yet correlated as such no physical activity is going on. Work on proposed Resettlement areas i.e. Spaira Ragha, Sheratalla plains and areas on left side of the dam not yet started due lack of PSDP allocation. Out of 14800 acres of Land to be acquired so far only 210 acres of land is acquired and measurement of 560 acres is completed. Still bulk payments are yet be made for land.

Shifting of huge public infrastructure which includes roads, School, Hospitals, madras and Government buildings will be hill of task.

7.4 TECHNICAL:

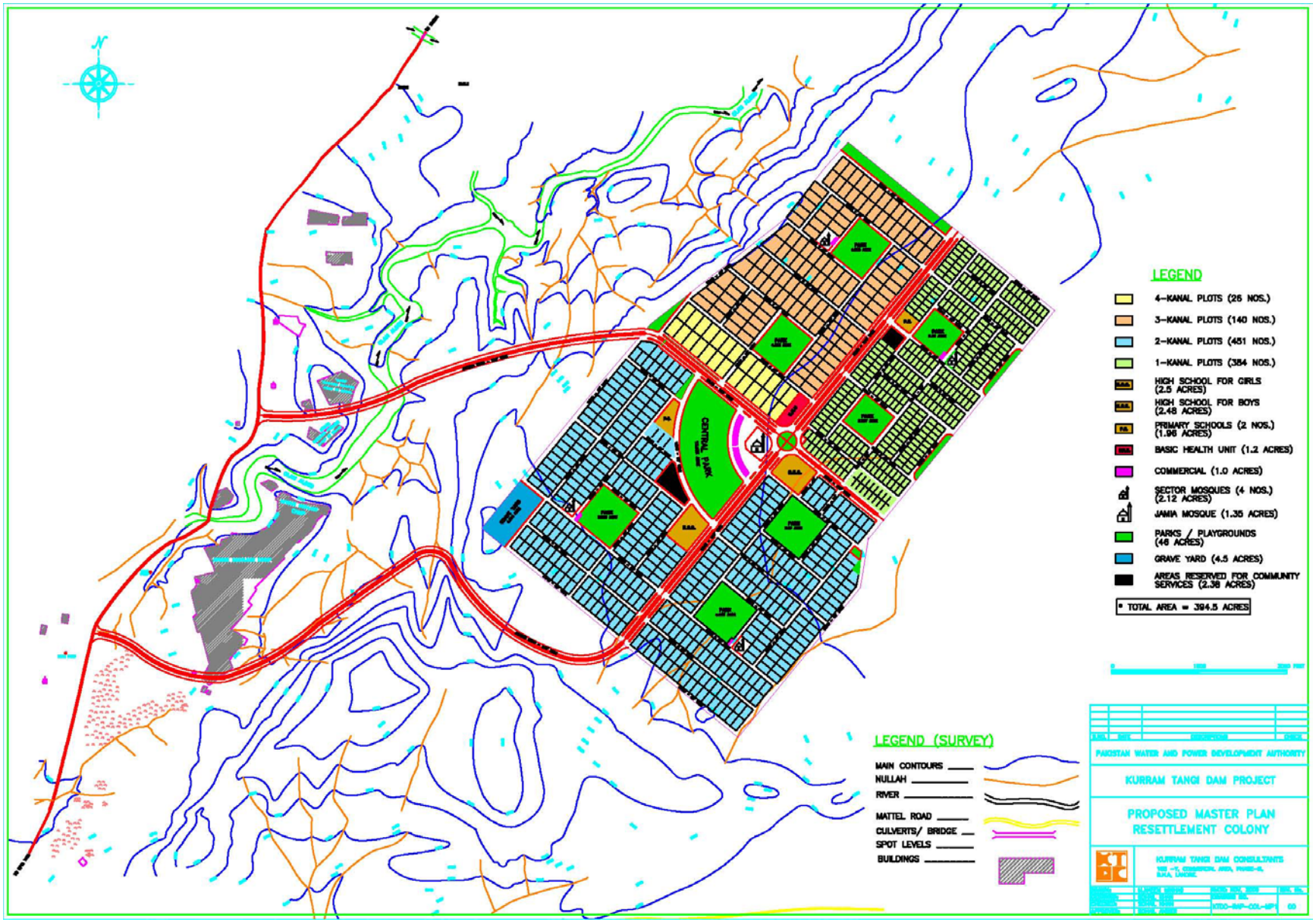
Feasibility Report was completed in 2004, Detailed Engineering Design finalized in 2010.
Original approved PC I (2005) was costing US $ 289 million and revised PCI under submission costing US $ 699 Million. Still lot of changes in final design after Consultants review of design.

7.5 COST VARIATION:

PC I cost based on 2004 feasibility report was US &$ 289 Million. Revised PC I, 2010 cost US $ 699 Million is under finalization. Cost of the project after receipt of Tenders by the Contractor may increase due to change in design and also due to Resettlement and security issues.

8.0 DOCUMENTS COLLECTED

- Detailed Engineering Design 2 Copies (Collected)
- Feasibility Report 2004 (Complete Set)
- TOR FOR Project Consultants (Collected)
- Scope of Work for EPC Contractor (Collected)
- Selection Criteria of Contractor (Not available)
- Approval Status of Revised PC I (PC 1 Not yet submitted)
- Status of Selection of Consultants (Not finalized with CCC)
- Status of Land Acquisition (No change status. No Fund)
- PSDP Allocation for 2011-12 (Rs. 100 Million yet to confirmed
- Status of Security Plan (Concept changed .Now Responsibility Of EPC Contractor)
- Security situation in Project Area (No Change in Status)
- Meeting With Consultants (6 Members of Project Consultant and 3 members WAPDA team)
- Status of WAPDA 500 acres resettlement plan. (Copy of Revised Master Plan comprised of 394.5 Acres Land collected)


N
CENTRAL PARK
LEGEND
4-KANAL PLOTS (25 NOS.)
3-KANAL PLOTS (140 NOS.)
2-KANAL PLOTS (451 NOS.)
1-KANAL PLOTS (384 NOS.)
HIGH SCHOOL FOR GIRLS (2.5 ACRES)
HIGH SCHOOL FOR BOYS (2.48 ACRES)
PRIMARY SCHOOLS (2 NOS.) (1.98 ACRES)
BASIC HEALTH UNIT (1.2 ACRES)
COMMERCIAL (1.0 ACRES)
SECTOR MOSQUES (4 NOS.) (2.12 ACRES)
JAMIA MOSQUE (1.35 ACRES)
PARKS / PLAYGROUNDS (46 ACRES)
GRAVE YARD (4.5 ACRES)
AREAS RESERVED FOR COMMUNITY SERVICES (2.38 ACRES)
TOTAL AREA = 394.5 ACRES
LEGEND (SURVEY)
MAIN CONTOURS
NULLAH
RIVER
MATTEL ROAD
CULVERTS/ BRIDGE
SPOT LEVELS
BUILDINGS
PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY
KURRAM TANGI DAM PROJECT
PROPOSED MASTER PLAN
RESETTLEMENT COLONY
KURRAM TANGI DAM CONSULTANTS

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