

GOVERNMENT OF KHYBER PAKHTUNKHWA IRRIGATION DEPARTMENT



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**N/O Work: - 210453-UPDATION OF FEASIBILITY STUDY & DETAILED
DSIGN OF TANK ZAM DAM, CHAUDWAN ZAM & DARABAND ZAM
DAMS DISTRICT TANK & D.I.KHAN**

RFP/TORs

**UPDATION OF FEASIBILITY STUDY & DETAILED ENGINEERING DSIGN
& PREPARATION OF TENDER DOCUMENTS & PC-I OF TANK ZAM
MULTIPURPOSE DAM, DISTRICT TANK**

DIRECTORATE GENERAL SMALL DAMS

October 2021

**Deputy Director (DSU)
Small Dams Section
Merged Area, Irrg. Deptt.**

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**“UPDATION OF FEASIBILITY STUDY & DETAILED DESIGN OF TANK
ZAM DAM MULTIPURPOSE PROJECT, DISTRICT TANK
TERMS OF REFERENCE (TORs) FOR CONSULTANT**

1. PROJECT IMPLEMENTATION

PART – I MODE OF IMPLEMENTATION / ORGANIZATION OF STUDY

1. Consultant will work under administrative control of Director General Small Dams Irrigation Department, Khyber Pakhtunkhwa.
2. Irrigation Department, Khyber Pakhtunkhwa will periodically review and advise on specific issues / activities of Consultants. Irrigation Department, Khyber Pakhtunkhwa will review the drafts of various reports / memoranda of Consultants before finalization.

INSTRUCTION REGARDING SUBMISSION OF PROPOSALS:

1. Three copies of the technical and one copy of financial proposals in stapled/fixed binded form are required to be submitted. Proposal should be in a sealed envelope indicating original or copy on each enclosure, as appropriate.
2. The proposals shall be valid for a period of 120-days after the last date of submission, which is extendable on the expiry of above period through mutual agreement.
3. The technical and financial proposals of the consultants will be evaluated according to criteria for procurement of consultancy services of the Government of Khyber Pakhtunkhwa, applying weight-age formula of 80:20 for technical and financial proposals respectively.
4. Financial proposals of "Technically Qualified" consulting firm will be considered and opened by competent forum in presence of the competitive firms' representatives. The contract agreement with successor firm will be governed by laws and regulations of the Govt. of Khyber Pakhtunkhwa. Financials proposal are also required to be submitted along with the Technical proposal in separate envelopes.
5. Your technical proposal should include the following information as well.
 - i. Year of formation, year of registration of the firm, postal address, e-mail, telephone/fax numbers with name of partners/proprietor and head and branch offices.
 - ii. Registration Number and latest renewal certificate of Pakistan Engineering Council.
 - iii. National Tax No. (NTN) with copy of the certificate.


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- iv. List of Similar nature works completed by the firm during last 10 years with detail of year of start/completion, cost of consultancy services, scope of the work and actual services performed by the firm individually and / or in a joint venture with specific details to be given in annexure.
 - v. List of Similar nature works in hand with cost of consultancy services, scope of the work and actual services performed by the firm, date of start and expected date of completion individually and / or in a joint venture with specific details to be given in annexure.
 - vi. Only those similar projects will be considered for evaluation for which the scope of services is mentioned in the data sheet of the firm furnishes evidence to this effect.
 - vii. The experience of the firm includes project handled by the firm and not by the individual employees of the firm in their personal capacity.
 - viii. List of professional staff and CV's of the key experts (duly signed by them or by the authorized representative of the firm) who will be handling the assignment with names, qualifications, year of passing various degrees and post qualification practical experience.
 - ix. A comprehensive write-up about approach and methodology, proposed work plan and manning schedule of various experts on a bar chart showing man-months of each expert, their responsibility and total time schedule for completion of the assignment.
6. Any clarification on the TORs and EOI may be sought before last date of submission of the proposals.
 7. The employer reserves the right for any addition alteration or amendment in the TOR of the Project and continues or discontinues consultancy services.
 8. Consultants shall be responsible for payment of all kind of taxes (direct & indirect both), levies etc in vogue time to time by Govt. in respect of personnel and other activities with no liability to the client.
 9. Originally signed CVs of the proposed personnel having contact number and postal address along with availability certificate of the personnel for the Project shall be annexed in the Technical proposal.
 10. The Consultants cost shall be inclusive of all kind of Taxes (direct & indirect both), levies etc. However, the Sales Tax as per applicable law shall be mentioned separately.
 11. The Consultants' financial bid/ proposal shall be deemed to cover expenses for each and every item of the scope of work/TORs. No payment shall be made for any item(s)


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mentioned in scope of work/TORs that the Consultant have intentionally or unintentionally presented as conditional, missed or not included in their technical and financial proposal. The consultants shall have to perform the same at their own expenses.

12. Payment for the personnel will be made as per actual time consumed on the Project but not in excess of the provision of man months made in the T.O.R. of Consultancy.
13. Payment to the Consultants for the survey and Geo-technical investigation and other investigation (if required) will be made as per actual work done at the site on approved MRS.
14. On the satisfactory performance of the services, the payment to the Consultants shall be made as per actual inputs, while in case of incomplete assignment; the payment will be made for the work done in accordance with the breakup of the services submitted by the Consultants and as determined by the Employer/Client.
15. Security deposit and income tax/sale tax etc will be deducted as per the prevailing Government rules notified during currency of the project.
16. The Consultant shall establish complete Project Office at Peshawar/nearest to site.
17. Consultants shall appear in Project meetings and site visits and shall also make presentation if so directed by the department for which no TA/DA, boarding, lodging and claim for incidental charges etc, shall be entertained.
18. The Consultant except with prior approval of the competent authority shall not sublet the study or any part thereof.
19. The Consultants will provide undertaking for the effect that the key staff would not be employed on the other projects during the currency of this project. Any violation will liable the contract for termination.
20. If the Consultant fails to complete any activity or part of the activity, the client reserves the right to execute the same at the consultant risk & cost.
21. If a project or part of project is dropped due to any reason, man months of the consultant key staff and logistics will be curtailed proportionally.
22. Consultant will be responsible for security of their staff. However, the security issues will be taken up with concerned security agencies.
25. Consultant shall provide indemnity bond.
26. Employer reserves the right to replace/withdraw/shared vehicle, person and equipment from the consultant if required.
27. The Consultant will have to adjust given/estimated Man-months for entire period till completion.


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28. TORs will be part of contract agreement.
29. Third Party validation (if required) of the Detailed Engineering Design local or International (as required by the Employer), will be the responsibility of the consultants, to get verify their contents of the study.
30. During the course of Detailed Engineering Design, the Consultants will arrange minimum of three secessions of Capacity building of the Departmental Staff/ Engineers regarding design related activities of Dams and Hydropower.
31. If the client (Irrigation department, Government of Khyber Pakhtunkhwa) suffer any loss due to proven design faults by the design consultants; then the consultants will be responsible as per PEC guidelines/KPPRA Rules or as the client deems appropriate.
32. The successful bidder/consultancy firm will deposit performance security @ 5% of bid cost in shape of bank guarantee or CDR as per KPPRA rule. (Para 24.2 standard procedure for selection of consultant).

PART - II BACKGROUND INFORMATION OF THE PROJECT / STUDIES

Location:

The Tank Zam dam site, is located at about 50 Kilometers from Tank on central Wazirestan Road. It is about 4 Kilometers from Jandola Town. The Tank Zam basin constitutes an area of 840 Sq-Miles. It lies between 32° N & 33° N (Latitude N 69° 15'E & 70° 15' E Longitude). Tank Zam originates from mountain in South Wazirestan & runs in a valley, which is about 43.25 Miles long

General description:

1. BACKGROUND

Storage and utilization of flood water flowing into various torrents, debouching from Suleman mountain ranges, for perennial irrigation of land, had been under consideration of the British rulers since early 1900. A concrete shape to the proposal was given by WAPDA in 1964, when M/S Energoproject, a Yugoslavian firm of consulting engineers, was entrusted in July, 1964 to prepare feasibility reports on hill torrents (Zams) viz Tank Zam, Darban Zam, Sheikh Haider Zam, Chaudwan Zam and Gomal Zam. The consulting firm abandoned the work in 1965, after Indo-Pak, sear due to funds constraint.

After Yugoslavian consultants left Pakistan, WAPDA undertook to carryout feasibility studies of aforementioned schemes through its Planning and Investigation (P&I) formation. Based on foreign consultants' preliminary report, WAPDA conducted further desk studies and some field investigations; and prepared a Pre-feasibility Report in December 1987.

WAPDA's Scheme comprised an embankment dam of 260 feet height at 1-linis Tangi (near jandola) with live storage of 237,300 AF and dependable flow of 132,000 AF/year, 10.5 MW lairgi hydropower plant; pick-up weir at Khirgi and intake system for 15 MW plant at Manzai; morning glory type spillway of 100,000 cs capacity; and 116 km long irrigation canals network for 45,000 acres CCA in Tank tells% now district.

Consultants finalized feasibility report with live storage 160,000 AF, Dam height 260 Ft, Spillway (Ungated over chute Ogee type) with 89,600 CS and CCA 70,000 Acres at 70% cropping intensity

Then after discussions and decisions by the Clients, it was directed to review for minimizing spillage, storing available water and a controlled spillway structure.


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The consultants revised final feasibility with live storage 289000 AF, Dam height 292 Ft, Spillway gated Open Chute Ogee type with 177238 Csc discharge and CCA 70000 Acres at 100% Cropping intensity.

Salient features of project as result of both studies and the reports are given at Table-I.

Updated feasibility option-I is more economical, have less risks and negative environments effects. The updated feasibility option-II is costlier involving more risks and negative effects. Its benefits for water availability, power benefits are more.

2. GEOLOGY

At the dam site, exposed rocks on both sides of river are predominantly hard, compact, fairly cemented conglomerate with calcareous material as cement in a matrix of sand and silt. Next dominant lithologic unit is fairly cemented, brown colored, medium to coarse grained, well-bedded sandstone, siltstone and silty clay. Bedrock under channel deposits is also thick bedded to massive conglomerate.

At right abutment, rocks are composed of 95%, compact, massive, regular, persistent bedded conglomerate, comprising almost all sizes of fairly cemented rock fragments of dominantly limestone, sandstone and quartzite with occasional occurrences of boulders. Bedding and dip direction is from bottom to top of the cliff, obviating possible seepage problem. Deep and parallel trenching along right bank of the river in basal part of the cliff is due to perpetual erosion of rocks by flowing river water. Rocks of left abutment are continuation of the rocks of right abutment across the river, under the channel deposits, with same lithologic, structural and textural characteristics. No worth mentioning joints are found in the exposed rocks.

Reservoir area is covered with river channel and thick old terrace deposits. Very small and insignificant patches of bed rocks indicate that major part of the reservoir has clay and sandstone. Massive conglomerate forms embankments of the reservoir. In Chapli Ozha Algad, a reverse fault has been observed. However, there will be no problem regarding seepage of water, as the fault is also dipping upstream similar to dip of the formations.

At Khirgi power house site, rock exposure is pre-dominantly composed of clay with interbedded sand stone and clay stone. A drilled hole, 160 feet deep, indicates that: Area is covered with about 8 feet thick overburden of boulders, gravels mixed with coarse to fine sand. Then, comes about 4 feet thick layer of conglomerate; thereafter, alternate layers of sandstone and conglomerate appear, thereby, reflecting formation of the type as assessed before drilling.

Alignment of latirgi weir is almost parallel to strike of the formation, and abutted against mostly weathered conglomerate. The bedding planes and presence of punts sandstone beds will create a remarkable downward seepage. This needs to be taken care-of during detailed design stage. Power tunnel # 1 passes through a series of conglomerate, sand stone and clay beds. All rock beds between dam axis and Khirgi powerhouse are constantly dipping towards dam axis,,The dips towards dam axis and power house are 45° and 20°, respectively.

Power tunnel # 2, between Khirgi and Manzai, will cross one shallow synclinal and an anticline folds. Here, dip of the rocks is gentler, about 10°. The tunnel is expected to be driven through a single bed of conglOmerate with occasional occurrences of clay beds. Proposed Manzai powerhouse is located at an anticline fold having soft conglomerate. The loosely bedded conglomerate is a mixture of gravels and pebbles with sand silt matrix.

3. SEISMIC RISK EVALUATION

Earthquake is the most devastating of natural hazards which in history has costed millions of lives; caused collapse of natural cliffs and mountains; changed courses of the rivers; and destroyed man-made structures. Majority of earthquakes are swift and make havoc in no

time. The earthquake of October OS, 2005 in Azad Kashmir and Kaghan Valley is example of such occurrence in Pakistan in the recent past. Effort to minimize the risk from this hazard for mega structure like dam is therefore of utmost importance

A catalogue of 548 earthquakes having magnitude of M-7-30 on Richter scale, which occurred within 400 Km radius around the Dam site, during past 00 years, was analyzed regarding their magnitude & frequency. Maximum credible earthquake was determined for circle of 50 KM, 100 Km, 200 Km, 300 KM & 400 Km around the Dam site. Seismic risk was then calculated in the form of peak ground accelerations (PGA). Main conclusions of the analysis are noted below.

- Intensity at Dam site on MM scale is VII
- PGA for above intensity recommended by different past studies varies from 10 to 34 %.
- seism tonic map of Pakistan shows an active fault striking N-S within 15-20 km of Dam site.
- Value of PGA calculated is 33%

4. HYDROLOGY & SEDIMENTATION

Tank Zam Dam project is planned to store the flows of the Tank Zam in a carry-over reservoir to be created by Construction of a dam at Tank. The stored water will be released to satisfy the irrigation, municipal & industrial water demand of the downstream area. The electrical energy generation will be a by-product.

Variation in annual and monthly runoff volume is very large. The inflow record reveals that average annual runoff in 13 years was less than the annual water demand. So a carry-over storage reservoir with a very large capacity should be provided to offset the shortages of irrigation, municipal and industrial demand and to create sufficient storage volume to store sediment anticipated to be deposited in the reservoir. Such a high dam is not technically feasible at the present site.

Ripple mass curves of critical low flow period were used to estimate the required capacity of the reservoir for CCA of 70,262, 80,000 and 90,000 acres. Very large live storages are required for CCA of 80,000 and 90,000 acres. Live storage of 310,000 AF is needed to satisfy the water demand of 196,418 AF for CCA of 70,262 acres. A live storage of 289,000 AF with a dead storage of 56,000 AF has been studied in detail reservoir simulation which has been conducted for the period of historic flow record, in accordance with an adopted set of rules. The reservoir has been operated to act as a carry-over reservoir with initial water level at El. 2285 ft. A reservoir rule curve was developed to minimize the water supply shortages and used in the reservoir simulation. If historic river flows are repeated, initial filling of Tank reservoir is likely to take several years. On the contrary, if river flows are similar to flows of 1991-92 (runoff = 689,720 AF) it will be filled within a year.

ICOLD recommends an un-gated overflow spillway for a high earth dam in a remote area but provision of an un-gated spillway is not recommended at the present site due to the following reasons:

With an ungated spillway, the HR., during the PMF flow would rise to 2272.7 ft giving a surcharge of 22.7' above the crest level of 2250'.

The above surcharge would require raising of dam by 22.7' but without providing any extra utilizable storage.

Hence a gate-controlled spillway has been designed to pass the PMF. Capacity and design of the spillway has been chosen conservatively to prevent dam failure by overtopping. Flash floods are experienced in the drainage basin due to steep topography and barren land. Such flash floods require the spillway to be in first-class operational condition all the time, especially during monsoon months. Contribution of service outlet has been ignored to pass a part of the flood. Radial gates consisting of cylindrical segment and supported by radial arms and trunnion pins have been

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adopted. Flip bucket with deflector vanes will project the jet into a thin sheet to minimize erosion in the stream bed.

The routing computations of the PMF gave a maximum flood surcharge of 1.7 ft above the normal reservoir level of 2285.0 ft with a corresponding Spillway discharge of 177,238 cusecs. Configuration of the selected spillway is as follows:

Spillway type:	Gate-controlled with ogee crest
Ogee crest:	At El. 2250.0 ft and u/s face at 1:1 slope
Gates:	(35 ft high) 5 radial gates, 40 ft X 35 ft
Abutment to abutment	
Distance, ft:	228 ft
Piers:	4 piers, 7.0 ft wide each
Approach channel:	400 ft long with base width 228 ft and side slope 3:1

As mentioned earlier the PMF has two peaks, first at 6 hours from start of the rainfall storm and the second at 40 hours with peak discharges of 230,804 cusecs and 181,630 cusecs respectively. The proposed spillway with gates while routing the PMF through the spillway will plan a maximum discharge of 177,238 cusecs as explained under paragraph 7.9 of this chapter.

The Salient features of the storage reservoir are given below:

i) Gross Storage	345,000 AF
ii) Live Storage	289,000 AF
iii) Dead Storage	56,000 AF
iv) Normal Pond Level	EL 2285
v) Dead Pond Level	EL 2171
vi) Area of Reservoir	4520 Acres
vii) HFL during PMF	El. 2287
viii) Wave height	5-0 ft.
ix) Free-board	5.0 ft.
x) Top of Dam	El. 2297
xi) Height of Dam	292

1. Major Components of the Project/ Layout Planning

A layout study for technically and economically feasible dam type and axis along with appurtenant structures was made by the Consultants. Two types of dam viz: Earth fill Dam and Arch Gravity Concrete Dam, and three sites A, B and C including previous proposed one, marked as "Dam Axis A" on figure 11.1 were considered. The sites B and C of dam axis are almost 1000 ft. and 1700 ft. from site A respectively. The layout study for Arch Gravity Concrete Dam was made at site A only but the proposal was dropped due to non-availability of firm rock in the river bed. However, layout study for Earth fill Dam was made at all proposed dam sites A, B and C and found feasible from geological point of view, availability of construction material and the safety concerns. The site at axis "B" has been finally selected

Keeping in view that 1:1 slope which is beneficial for providing joints and appurtenant structures such as spillway and intake of power tunnel is available.

Accordingly, an Earthfill Dam 292 ft. high, 1600 ft. wide at top (across the river) and 14(X) ft. long (along the flow) has been proposed at above said site-0, as shown on figures 11.2, and 13.5 alongwith following appurtenant structures:

An R.C.C lined diversion tunnel with internal diameter of 35 ft. and length of 2735 ft. in the right abutment of dam, keeping its intake and outlet invert levels almost at river bed.


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An gated overflow chute spillway with an ogee crest at the right abutment of the dam with a total width of 208 ft. from abutment to abutment at control structure and a total length of 756 ft. from control structure to flip bucket.

An intake structure for power tunnel-1 of Khirgi power house located in the left abutment of the dam. The length of power tunnel including penstock is almost 14200 Rft. It will run in the direction of north-east parallel to Tank Zam River at a distance of 100 ft. to 1500 ft. upto Khirgi power house.

A pick-up weir structure of 20 ft. height, 300 ft. width (from abutment to abutment) and 292 ft. length (from upstream cut-off to downstream cut-off) has been proposed on Tank Zam River near Khirgi village to regulate the flows for Manzai power house, to be constructed near Manazai village about 7 km away from Khirgi. The intake structure of the power house has been proposed just upstream of the right abutment of Khirgi weir and the total length of power tunnel-2 including penstocks from Khirgi to Manazai power house is 33650 ft.

The water discharges coming out from power house will be conveyed to main channel of irrigation system through a 600 ft. long lined tailrace channel. The command area boundary starts from approximately 5 km downstream from the Tank Zam mouth and it stretches eastward beyond Takwara village. Out of the gross command area, 70,000 acres have been selected for irrigation keeping in view the categories of land and water rights classified by WAPDA.

DIVERSION DURING CONSTRUCTION

i Diversion Tunnel

Discharge	39676	(At flood water level of 2073)
Dia.	33 ft.	
Length	2735	
Invert Ele.	2025	
Lining	RCC	
Location	Under right abutment	
	after plugging to be converted as 2- stage under sluices	

ii. U/s Cofferdam

Height	75 ft.
Type	Earth fill
Crest	2100 ft.

iii D/s Cofferdam

Height	15 ft.
Type	Earth fill
Crest	1995 ft.


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8. POWER COMPONENTS

8.1 POWER TUNNELS, PENSTOCKS AND TAILRACE CHANNELS

The selected power facilities comprise the following:

- i) Two powerhouses (one underground at Khirgi and one above ground, at Manzai), each with three units and incorporating erection bay, unloading area, draft tube, surge chamber and control room.
- ii) Two intake structures, one for power tunnel-1 in the left abutment of main reservoir with two stage entrance at invert levels El. 2080 ft. and 2150 ft; and one intake structure in the right abutment of the balancing reservoir near Khirgi weir feeding the power tunnel-2 at invert level El. 1680 ft.
- i. Two gate shafts, one for power tunnel-1, about 350 ft. Downstream\ from intake structure with top at El. 2285 ft; and the other for power tunnel-2, about 65 ft. downstream from intake structure with top at El. 1735 ft.
- ii. Two power tunnels each of 6.5 ft. internal diameter and lengths of 14,200 ft. and 33,650 ft. with six penstocks, three of them are of 3.5 ft. internal diameter and three of 3.75 ft. internal diameter.
- iii. Six turbo-generating sets, three having generating capacity of 3.5 MW, each, and three for 5 MW, each.

Maximum discharge through the tunnels 1 and 2 will be 280cfs and 317 cfs for effective heads of 550 ft. and 700 ft. and power generation of 10.5 MW and 15 MW, respectively. Circular shaped tunnels have been selected to pass flows with an average velocity of about 8 to 9 ft. /sec.

Provincial Irrigation & Power department would maintain and operate the dam out of provisional resources, the proprietary rights of power generation shall rest with the Government of NWFP which would be sold to WAPDA. "

AGRICULTURE

The Project command area is, presently, under Rod-Kohi system of agriculture. This farming is mostly of subsistence level and survival oriented, in spite of the fact that the cultivated land is very fertile.

Total area of Tank District is 409,191 acres viz: Forest-112,210 acres; un-cultivable area 17,677 acres; and under Rod-Kohi system-165,599 acres, out of which, currently, only 49,661 acres are used for cultivation. Presently, water availability in the area is: Through ram water-about 8,224 acres, from tubewells-495 acres and flood/barani irrigation-40,942 acres. Cropped area of Tank Zam command is 11,649 acres viz, Rabi 9,398 acres and Kharif 2215 acres. Cropping on Barrani/Rod-Kohi is confined to sorghum, wheat, gram, millets and mustard crops. The existing cropping intensity is 19.57% in Rabi and only 4.55% in Kharif. Yields of crops are low in the irrigated and flooded/barani areas.

For future agriculture with Project, about 70,000 acres of land will be developed. Presently sown crops will generally be grown.

Annual cropping intensity of 100% is proposed. Crops with low water requirement (Rabi crops) and high return of water will be grown to cover maximum CCA with available water. In the proposed cropping pattern, wheat and pulses are major crops in Rabi, while in Kharif sugarcane, rice, cotton and orchards are placed because of new developing trend of the area for growing cash crops.

10. SOCIO ECONOMIC

Population density as per 1998 census is 142 persons per sq. kilometer. The land is partly hilly and partly plain. Climate is arid and hot. Average annual rainfall is 270 mm and evaporation 1650 mm. The most prominent tribes of the area are Kundi, Ganda Pur, Bhattani, Mahsood and fats. Staple food is wheat-bread. Houses of the rural areas are mostly katcha and are gradually being replaced with pacca buildings. There is no sewerage system in the area. The population mostly depends on agriculture for their livelihood. About 80% peoples speak Pushto and remaining 20% are Sriaiki speaking.

11. IRRIGATION SYSTEM

12. CANAL IRRIGATION NETWORK

The Main Canal has been aligned on high ridge to irrigate the land on its two sides. It starts from the tail race of Manzai power house with a full supply discharge of 317 cosecs. There are seven distributaries off-taking from the Main Canal at different RDs to irrigate the area falling under the respective commands. The Main Canal runs for the first 24 RDs as feeder canal and from that point the boundary of command area starts. Total length of the canal system is about 73 miles. Cross drainage structures have been proposed on the Main Canal and distributaries. The total Gross Command Area (GCA) is about 85,000 acres, while CCA is 70000 acres.

Crop Water requirements has been worked-out using FAO methodology. This has been done to ensure that the available water supply is best utilized with a specific cropping pattern and cropping intensities. Efficiency of irrigation system, from Main Canal to field application for crops is taken 55% to compute water discharge at head of the Main Canal.

Main Canal and distributaries have trapezoidal section with side slopes of 1:1. The channels are lined with 3000 psi PCC. Thickness of lining for sides is 3 inches and for bed is 4 inches. Free board for lining varies from 9 inches to 12 inches and for banks from 1.5 ft. to 1.75 ft.

PART - III AVAILABLE REPORTS, STUDIES DATA AND INVESTIGATIONS

Following studies has been carried out on Tank Zam Dam Multipurpose Project since 2006:

Feasibility Study of Tank Zam Dam

The Government of Khyber Pakhtunkhwa, Irrigation department engaged J/V of National Development Consultant Lahore & three other firms to prepare detailed feasibility report of Tank Zam Dam in January 2006.

Feasibility Study comprises of 08 Volumes. Necessary/required detail of the Project have been incorporated in this RFP/TORs.

PART-IV OBJECTIVES OF PROPOSED STUDY

The main objective of the Project is the irrigated-agriculture development of under developed region of the country to increase agricultural production. It will also provide increase production leading to self-sufficiency in food and fiber.

- a. The study is aimed to conduct Detailed Engineering Design of the scheme, including power component, preparation of PC-1 and Tender/ Bidding Documents.

- b. The study is also aimed at establishing the bankable engineering design of Tank Zam Dam Multipurpose Project with due consideration of its water benefits, including Irrigation Department, Khyber Pakhtunkhwa, agriculture, hydropower potential and fisheries developments.
- c. The activities will cover undertaking of further studies, investigations, surveys required to confirm and upgrade the previous results and economic, financial, social and environmental aspects of the Project already conducted during Feasibility Stage.
- d. The investigations and studies shall be of such a quality to allow Irrigation Department, Khyber Pakhtunkhwa and GoKP to arrive at a definite decision concerning implementation of the Project.
- e. Overall level of study and the degree of details on each aspect shall be sufficient to meet acceptability criteria of international donor agencies that can be approached to assist for funding of the project at construction stage.

Project aims to meet the following objectives:

- a) Irrigated Agriculture Development (70,000 Acres);
- b) Flood Mitigation;
- c) Drinking Water Supply to nearby community;
- d) Hydropower Generation (25.5 MW);
- e) Fisheries Development;
- f) Ground Water Recharge; and
- g) Socio-Economic uplift of the area.

To accomplish the task, Irrigation Department, Khyber Pakhtunkhwa will hire the Services of Consultants through "National Competitive Bidding" process. The consultant will be responsible to carry out all studies/Investigation which are mandatory in the proposed study. International consultants firms shall also be allowed to participate in J/V with Pakistani based eligible consultants firms as per PEC guidelines/laws.

PART-V SCOPE OF WORK OF PROPOSED STUDY

Consultants will review the previous studies and undertake additionally required studies / investigations. Based on the overall data, studies, survey and investigations, the Consultants will accomplish the assignment in the sequence hereunder:

Overall

The assignment will involve:

- Review Feasibility Report and update all existing studies, reports and data available;
- Carrying out investigations / survey (in the manner laid down at para 7 of Part-I above); and
- Preparation of Project Planning Report, Detailed Engineering Design, Tender Documents & PC-I.

The assignment will be accomplished in following tasks as below **(18 Months Completion Period)**:

- | | |
|----------|---|
| Task-I | Inception Report (2 nd Months) |
| Task-II | Project Planning Report (12 th Month) |
| Task-III | Separate PC-I for the subcomponent Land Acquisition/Resettlement (12 th Month) |


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- Task-IV Draft Detailed Engineering Design, Draft Tender Documents & Draft PC-I. (15th Month)
- Task-V Final Detailed Engineering Design, Final Tender Documents & Final PC-I of the whole project. (18th Month)

TASK - I INCEPTION REPORT

Task-I will cover review of all existing survey / field investigations, feasibility reports and documents available with Irrigation Department, Khyber Pakhtunkhwa. The Consultants will also review preliminary design of various components given in the reports and various studies, evaluate project benefits and cost considering the time of Implementation. Based on the findings of the review and additional work done by Consultants, the **Inception Report** will be prepared discussing alternate project layouts, area to be irrigated / benefited, water availability / requirement, seism tectonic study including infrastructure for implementation and operation of Tank Zam Dam Multipurpose Project. The report will also include: the detail of field investigations / survey / studies required for accomplishing the assignment, social and environmental impact assessment, staffing status, detailed work program for the Study and any other findings / recommendations for review and concurrence by the Client, giving particular attention to water benefits in terms of power and Irrigation Department, Khyber Pakhtunkhwa.

TASK - II PROJECT PLANNING REPORT

The following services to be performed on the basis of Task-I shall be covered under the Task - II.

- a. In order to support the conclusions under Task-I, additional field survey / investigations will be conducted under the supervision of Consultants.
- b. Project layout, for different canal alignments, locations of embankments/ structures, intake structures shall be developed to the degree of detail necessary to provide a fair comparison between the alternates.
- c. Review of available data and produce comprehensive studies, which may comprise but not limited to the following:
 - Evaluation of existing downstream water rights with future projections.
 - To workout crop water requirements based on appropriate cropping pattern keeping in view the existing farming practices over the respective/contiguous command area.
 - To chalk out most optimum alignment of water courses based on the respective Engineering/Revenue Chakbandi.
 - Complete analysis of potential impact on water table in the adjoining area and its implications on the fertility of irrigated agriculture
 - The latest research substantiates that in the post dam scenario the downstream river bed will get substantially incised and as such it is prudent to analyze its possible impact on the existing structures and off taking facilities on the downstream side of the proposed dam if any.


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- To propose specific treatment (based on geo – technical investigation to the rock in contact with the fill at the abutment, foundation and in the reservoir area to avoid failure due to leakage at the contact points.
 - To examine the option of gated spillway and its capability to eject reasonable sediment load amid high flood that may enhance the dam's useful life.
 - Similarly, to estimate the sediment contents/load to be drawn by the dependent/ off taking irrigation network.
 - Complete Chemo – Physical analysis of the incoming sediments and its impact on mechanical components with recommendation for appropriate remedial measures.
 - To study the efficacy of sediment flushing facility already proposed and to frame appropriate Standard Operating Procedure (SOP) for its optimal operation
- Geological and Geotechnical Studies;
 - Hydrological data collection studies;
 - Neo & Seism tectonic Studies;
 - Seismic Risk Analysis;
 - Layout Plan and Optimization of Project Components / features;
 - Design of Main Dam, Dyke, Spillway, Canal System & other Appurtenant Structures;
 - Hydropower Development Studies including Power generation & Evacuation Plan;
 - Soil and Agriculture Studies;
 - Drinking Water Supply, Ground Water Recharge, Fisheries Development Studies;
 - Development / Updating of Irrigation Department, Khyber Pakhtunkhwa System and Associated Structures;
 - Socio-Economic Studies;
 - Environmental Impact Assessment (EIA) with Environment Management Plan (EMP) and Social Impact Assessment (SIA) with Resettlement Action Plan (RAP);
 - Construction Planning & Contract Packaging; and
 - Financial and Economic Analysis with and without CDM.
- d. Seismic risk evaluation to determine seismic design parameters for various project components. Disaster Risk during the Project implementation will be evaluated and mitigation measures be proposed as presented in "Checklist for Disaster Risk Reduction" (**Attachment - A**).
- e. The population resettlement and the environmental aspects of the project will be assessed (reassessed in case of priority (ii), Task-I) and quantified. The costs and benefits of resettlement and environmental aspects shall be taken into consideration in assessing the economic and financial viability of the Project. For the economic feasibility, all costs and benefits shall be valued in economic terms, while for the financial feasibility, shall be expressed in financial terms.

- f. Preparation of detail Engineering/Revenue Chakbandi/warabandi for irrigation system.
- g. Submission of complete design calculations & backup data to client.
- h. Keep/study provision of future raising of Dam if possible/required.
- i. To complete land acquisition process for the project as per client instructions/requirements
- j. Consultants shall present their conclusions and recommendations to the above effects, in the shape of **Project Planning Report**, for review and concurrence by the Client.

Guidelines

- a. Consultants will follow the given design standards:
 - For Materials testing ASTM
 - For Structures AASHTO, ACI & AISC, ASC Manual of RCC Conferences on R.C.C. Dam/ECRD.
 - For Seismic design ACI / AASHTO code with latest Seismic Zoning Map for Pakistan.
- b. Consultants shall proceed with the work, to determine and firm up the technical, economic and financial feasibility of the selected layout of the Project.
- c. Activities to follow this will include, but not limited to;
 - i. Preparation of project layout covering all the components of the Project including the layout of infrastructure facilities required for implementation and operation stage of the Project.
 - ii. Preparation of Project Planning level designs of all structures for the selected alternate, and the components of the Project; layout of each major structure; and sufficient cross-sections to establish the magnitude and characteristics of the work and their construction costs, excluding infrastructure facilities.
 - iii. For purpose of estimating project cost, all unit prices for major quantities of work shall be established by the latest methods. These methods will simulate each construction activity in such a way as to fit it into the available time span in the proposed construction schedule. Construction equipment, crews, materials and other resources would be adjusted to accomplish the work within the required time-span. The computations of unit prices shall be supported by detailed sets of financial prices with source.
 - iv. Indirect cost of construction for all major items into which the construction work is subdivided for cost estimating purposes, should be established separately. Total cost of each construction item shall then be obtained by multiplying the direct cost of construction, by a bid factor representing the influence of indirect costs.
 - v. Preparation of cost estimates of the Project broken down into local and foreign components. These shall include:
 - Major items like electro-mechanical and civil works including power house, main dam, dyke, spillway, intake & outfall structures etc. Price of major civil works and permanent equipment shall be estimated on the basis of ICB.
 - Environmental Impact Assessment with Environmental Management Plan & Social Impact Assessment with Resettlement Action Plan with cost estimation including Clean Development Mechanism (CDM).

- Project Engineering and Management expenses, the owner's overhead expenses, and an adequate allowance for physical contingencies.
 - Import duties, taxes and interest during construction (to be assessed separately and not be included in the base cost estimates).
- vi. Price escalation provisions shall be computed on the basis of the construction schedule for Local and Foreign Currency Components on the criteria followed by the Planning Commission, Government of Pakistan. These price escalation provisions shall not be included in the economic cost estimates and shall be used only for financial forecast and financial requirement purposes.
 - vii. Possibility of prospective project financing and implementation through different modes i.e., Private Sector/Public-Private Partnership (PPP) etc.
 - viii. Preparation of a construction schedule using CPM analysis and schedules for annual construction expenditures, both for Local and Foreign Currency Components, throughout the Construction period, as well as a schedule of annual expenditures for the Environmental Impact Assessment/ Resettlement Action Plan and other items which generally extend beyond the project commissioning.
 - ix. For the purpose of economic analysis, power and Irrigation Department, Khyber Pakhtunkhwa benefits of the Project shall be based on realistic assumptions as to their value and on alternate scenarios for use of water in the existing or new irrigated areas. Based on the Project benefits, Economic Internal Rate of Return (EIRR), Net Present Value (NPV) and Benefit Cost Ratio (BCR) will be worked out to indicate the economic justification of the proposed project.
 - x. The financial analysis will cover the envisaged power and Irrigation Department, Khyber Pakhtunkhwa benefits available from the Project. The analysis will be carried out to identify and quantify benefits and costs expressed in financial terms using indicators i.e. Financial Internal Rate of Return (FIRR), Net Present Value (NPV) and Benefit Cost Ratio (BCR) in both scenarios i.e. with or without CDM benefits.
 - xi. Consultant will analyze Risk and Sensitivity of the Project output. They will propose an appropriate model after recalculating project outcomes (NPV, EIRR) for different values of major variables and combinations of variables.
 - xii. Consultants will submit a Draft Project Planning Reports to be discussed in Irrigation Department, Khyber Pakhtunkhwa for their views / comments. After clearance, the final Project Planning Report will be issued.
- d. Consultants shall present their conclusions and recommendations to the above effects, in the shape of **Project Planning Report**, for review and concurrence by the Client.

TASK - III LAND ACQUISITION PC-I & RESETTLEMENT PLAN

- a. Preparation of detailed EIA Report as per Pakistan Environmental Protection Act & its approval from EPA Khyber Pakhtunkhwa.
- b. Preparation of complete estimate of land under submergence & required for all appurtenant structures as per standard practice in merged area of Khyber Pakhtunkhwa. (Land Acquisition & Resettlement Plan)
- c. Complete detail of infrastructure under submergence & resettlement plan.
- d. Complete details of dislocation (if any) along with complete compensation plan.

- e. Preparation of comprehensive environmental protection plan during construction phase.
- f. Preparation of Separate PC-I for Land Acquisition during Design phase.

TASK-IV DRAFT DETAILED ENGINEERING DESIGN, TENDER DOCUMENTS & PC-I

- a. Preparation of Draft Detailed Engineering Design of all structures of the selected alternate including the components of the Project as at Part-II above. Environmental Impact Assessment with Environmental Management Plan & Social Impact Assessment with Resettlement Action Plan, cost estimation will also be prepared under Task - III.
- b. Preparation of detailed drawings of each structure and BOQ.
- c. Preparation of tender drawings with sufficient details in respect of the above for International Competitive Bidding.
- d. Preparation of tender documents in line with FIDIC, PEC, KPPRA World Bank, WAPDA guidelines and standard practice for donor funded projects. The tender documents shall cover the Civil / Electro-Mechanical works of the Project and its components.
- e. Based on the Project Planning Report, Detailed Engineering Design, Tender Documents and PC-I will be framed as per the guidelines of Planning Commission of Pakistan. Tender documents for each contract package shall consist of the following volumes;
 - Volume - I:** Invitation to Bids, Instructions to Bidder, General Conditions and Special Conditions
 - Volume - II:** Technical Specifications
 - Volume - III:** Forms of Bid, BOQs, schedule of forms of Bank Guarantee for Bid Security, Performance Security and advance mobilization loan
 - Volume - IV:** Contract Drawings
- f. Consultants will submit a Draft Detailed Engineering Design, EIA, SIA, EMP & RAP Reports, Tender Documents and PC-I to be discussed with Irrigation Department & other stake holders for their views / comments. After clearance, the final Reports will be issued.

TASK - V FINAL DETAILED ENGINEERING DESIGN, TENDER DOCUMENTS & PC-I

Final Detailed Engineering Design report will be submitted after attending the entire comments from the Departments and Implementation of suggestions/ changes as per third party validation of the study.

2. REPORTING AND DOCUMENTATION

This will, inter-alia, cover the following:

- a. Submission of Inception Report within first two (02) months of receiving notice to proceed from the Client (Draft: 10 copies; Final: 20 copies).
- b. Submission of regular monthly progress reports of implementation progress and financial status summarizing problem areas, proposed modifications and future action for the Client's use (20 copies).

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- c. Preparation of special reports / memoranda to elicit Client's consent / approval on specific issues (20 copies).
- d. Submission of Project Planning Report within first Twelve (12) months of the Project to enable Client's concurrence (Draft: 10 copies; Final: 20 copies).
- e. Submission of comprehensive land acquisition PC-I for approval of competent forum.
- f. Submission of Detailed Engineering Designs, EIA, SIA, EMP & RAP Reports, Quality Assurance / Quality Control Manual & Tender Documents. (Draft: 15 copies; Final: 50 copies).
- g. Submission of PC-I Proforma (Draft: 20 copies; Final: As required by Approving forums i-e PDWP, CDWP, ECNEC, NEC).
 - i. Consultants will complete the assignment and submit all documents within a period of Eighteen (18) months from the date of commencement.
 - ii. All submissions including software's purchased during the Study, spreadsheets with formulae, reports & maps shall be provided in editable format to the Client along with Compact Discs (CDs)/ flash drive for future reproduction on the same format on which reports/ maps etc. are prepared (05 sets).
- h. Third Party Validation Report (10 Copies)

3. STAFF INPUTS (CONSULTANTS)

The following provisions are available for the engineering study of the Project.

- Man-months inputs of technical / support staff are given below.
- Foreign technical input is at liberty of consultant.

Key personnel's required qualifications & experience is attached (**Attachment - B**).

4. THREE TRAINING SECESSIONS OF IRRIGATION DEPARTMENT, KHYBER PAKHTUNKHWA KPK STAFF

Consultants shall arrange 03 times on job training session on design of Dams & HPP for Irrigation Department, Khyber Pakhtunkhwa/ Tank Zam Dam Project Staff, to be nominated by PD Tank Zam Dam. (8 persons in each session)

5. ADDITIONAL SERVICES

Regarding any services additional to those specified above, Consultants, if specifically requested by Irrigation Department, Khyber Pakhtunkhwa KPK, shall;

Provide specialist technical advice on aspects of the works that are not normally required / provided during the studies. However, any services which are not specifically mentioned in the TOR above but are allied and essential for the effective implementation and completion of the Project will also be provided by Consultants and will be deemed to have been part of this TOR.

6. RESOURCES

The client shall not provide any manpower logistic support in terms of technical or non-technical support staff, surveys, geotechnical investigations, transportation and traveling accommodation, office space, equipment, printing, courier and utilities etc. The Consultants should accordingly include cost of all the above and that of any other items(s) that the Consultants consider necessary for the project execution. However, the Client reserves the right to nominate the Engineering staff to sit with Consultant to acquaint them with the design process.


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7. MAN MONTHS & LOGISTICS

Sr. No	Description	Man Month	Rate* (Rs.)	Amount (Rs. in million)
A	Consultants Technical Staff			
1	Project Manager / Team Leader	18		
2	Expert (Geotechnical)	10		
3	Expert (Hydrology and Sedimentation)	8		
4	Expert (Electrical / Mechanical)	8		
5	Expert (Hydraulic Design)	8		
6	Expert (Dam Design)	8		
7	Expert (Structure Design)	8		
8	Expert (Environment)	6		
9	Expert (Resettlement)	4		
10	Expert (Construction Planning)	8		
11	Expert (Hydropower)	8		
12	Principal Geologist	12		
13	Principle Electrical / Mechanical Engineer	12		
14	Principle Structure Design Engineer	8		
15	Principal Reports / Documentation Engineer	12		
16	Principal Contract Engineer	12		
17	Principal Economist	8		
18	Principal Hydropower Engineer	10		
18	Principal Sociologist	10		
19	Senior Engineers / Surveyor / Costing Engineer	18		
20	Jr. Engineers / Jr. Geologists	36		
21	Jr. Economist / Jr. Sociologist / Seismologist	18		
22	AutoCAD Operators	36		
23	Computer Operator	18		
	Subtotal – A	304		


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Study Period = 18 Months

Sr. No.	Description	Qty.*	Unit	Rate** (Rs.)	Amount (Rs. in million)
	<p>Topographic and cadastral survey for head works/Dams & other irrigation projects by using Total station GPS, etc. with minimum 30 number of point reading per acre, to generate 15mx15m grid and 0.5 m interval contours including transfer of entire data to computer system in different geo-referenced layers / themes using features of standard software, compatible with design software packages, including supply of soft and hard copies of point readings, including digitizing village maps and super imposing the contours on village map (scale 1in 4000) including marking all permanent features like roads, cart tracks, existing canals, mosques, tanks, forest boundary and electric poles, etc. including marking of ridges and valleys on survey sheet including supply of 4 soft copies and 4 hard copies after approval of competent authority, preparation & submission of grid and L-section nalla etc. complete</p>				
1	Reservoir	4,520	acres		
2	Detailed topographic survey of dam site, spillway, borrow area, power house, dykes and other structure along with digitization.	375	acres		
3	Strip survey 100 m wide on both sides of tunnel, main canal alignment and drinking water supply line along with digitization.	2500	acres		
4	Commaand Area	82,100	acres		
5	Traversing and Precise leveling from B.Ms for establishing survey datum at dam site (fore and back).	2500	acres		
6	Longitudinal profile & cross-sections of nullahs.	25	No.		
7	Construction of permanent B.Ms at various sites.	25	No.		
	Total				


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Sr. No.	Description	Qty.*	Unit	Rate (Rs.)	Amount (Rs. in million)
1	Drilling by diamond drilling, holes of minimum 75 mm dia. vertical or at specified inclination using diamond core drilling bit, double barrel tube in masonry, concrete or rock including cost of all materials, machinery, labour, water, collection of core samples, logging & labelling samples, supplying wooden core box and re-drilling in case of collapse of sides etc. complete. excluding cost of mobilization & demobilization. (For depth 0 to 50 m and inclined at 0o to 10o vertically downward)				
	A. Dam axis				
	a. Abutments: 8 boreholes each of 75 m depth.	600	m		
	b. River Bed: 6 boreholes each of 75 m depth.	450	m		
	B. Spillway				
	06 boreholes each of 100 m depth on intake, chute & silting basin.	600	m		
	C. Power House				
	08 boreholes each of 50 m depth.	400	m		
	D. Diversion Tunnels, Low Level Outlets & Power Tunnels				
	10 boreholes each of 50 m depth.	500	m		
	Subtotal	2,550	m		
2	Test Pits				
	35 Nos. test pits in structure, borrow areas (3 m x 3 m x 3 m).	945	m ³		
3	Geo-physical Seismic Refraction Survey.	2,000	m		
4	Exploratory Adits (02 Nos. each of 25 m x 2.25 m x 2.25 m).	253	m ³		
5	Geological Mapping of reservoir & dam structure areas.	900	hectare		
6	Laboratory testing for core drilling and test pits (sieve analysis, hydrometer, specific gravity / absorption, unit weight analysis, organic impurities, sodium sulphate, soundness, petro graphic analysis, porosity, permeability, direct shear, unconfined compression strength, slake durability, sonic velocity and proctor test etc.).	1	Job		
	Total				

Sr. No.	Description	Qty	Unit	Rate (Rs.)	Amount (Rs. in million)
1	Procurement & Installation of Stage Gauges & Procurement of Sediment Samplers	1	Job		
2	Automation of Gauges, Networking & Transmission of Data	1	Job		
3	Hydrographer (1 No.)	24	Man - Month		
4	Gauge observer (3 Nos.)	72	Man - Month		
5	Sounding Attendant (1 No.)	24	Man - Month		
9	TA / DA	24	Month		
10	Stock & misc. items	24	Month		
Total					

Sr. No.	Description	Amount** (Rs. in million)
1	Hydraulic Model Studies of: - Comprehensive model of Spillway; - Intake / Outlets structure; and - Diversion tunnels.	
Total		

Sr No	Item	Unit	Qty	Rate (Rs.)	Amount (Rs. in million)
PROJECT OFFICE (PO)					
A Furnished accommodation with air conditioning					
1	Office rent	Month	18		
2	Air conditioners (Invertor Split Type)	No.	4		
3	Heaters (Electric)	No.	4		
Office furniture					
4	Office Table 6'x4'	No.	4		
5	Office Table 5'x3'	No.	8		
6	Office Desks	No.	10		
7	Revolving office chairs	No.	5		
8	Office chairs	No.	15		
9	Side Racks	No.	5		
10	Filing cabinets	No.	4		
11	Computer tables with chairs	No.	6		
Subtotal – A					
B Electricity, water and gas charges					
1	Electricity, water and gas charges.	Month	18		
Subtotal – B					
C Office equipment					
1	Latest computers with accessories and UPS etc.	No.	6		
2	Laser printer (A3 size) colour	No.	1		
3	Laser printer (A4 size)	No.	3		
4	Plotter	No.	1		
5	Photocopy machine heavy duty	No.	1		
6	Networking of computers	Job	1		
7	Internet connections	Job	1		
8	Fax machine	No.	1		
9	Scanner (A3 size)	No.	1		
10	Refrigerator	No.	1		
11	Water dispenser	No.	1		
12	Miscellaneous items (telephone connections, telephone sets etc.)	Job	1		
Subtotal – C					
D Office supplies and stationery					
1	Office supplies & stationery	Month	18		
2	Plain paper for drawings	Job	1		
3	Photocopying paper packets	Job	1		

	4	Computer stationery, toner, USB memory, CD, spares etc.	Mont h	18		
Subtotal – D						
E Printing and binding of reports						
	1	Printing & binding of reports	Job	1		
Subtotal – E						
F Telex, postage, courier and telephone charges						
	1	Telephone calls & internet	Mont h	18		
	2	Fax	Mont h	18		
	3	Postage/ Couriers	Mont h	18		
Subtotal – F						
G Transport including running and maintenance						
	1	Toyota Dubble cabin 4x4	Qty	2		
	3	POL& Maintenance	Mont h	36		
Subtotal – G						
H Non-technical / Work charged staff						
	1	Office manager	Mont. h	18		
	2	Accounts officer	Mont h	18		
	3	WPOs (01 Nos.)	Mont h	18		
	4	Naib qasid (02 Nos.)	Mont h	36		
	5	Chowkidars and mali (02 Nos.)	Mont h	36		
	6	Photocopy machine operator	Mont h	18		
	7	Caretaker	Mont h	18		
	8	Driver (02 Nos.)	Mont h	36		
Subtotal – H				198		
I Travelling and field allowances						
	1	Travelling for project work	Mont h	18		
	2	Daily allowances for visiting /site staff	Mont h	18		
Subtotal – I						
J Software / Literature / Data						
	1	Software/ Programs	Job	1		
	2	Books / Journals / Magazines etc.	Mont h	36		
Subtotal – J						
FIELD OFFICE (FO)						

K	Furnished accommodation				
	1	Rent for site office	Mont h	7	
		Office/Hostel furniture			
	2	Office table 5'x3'	No.	2	
	3	Office desks	No.	4	
	4	Office chairs	No.	8	
		Subtotal – K			
L	Electricity, water and gas charges				
	1	Electricity, water and gas, etc.	Mont h	7	
		Subtotal – L			
M	Office equipment				
	1	Latest computers with accessories and UPS etc.	No.	1	
	2	Laser printer (A4 size)	No.	1	
	3	Fax machine	No.	1	
		Subtotal – M			
N	Running maintenance of office and office equipment				
	1	Maintenance of office, living accommodation, mess etc.	Mont h	7	
	2	Mobilization/ demobilization and transport of equipment and furniture at site	Job	1	
		Subtotal – N			
O	Office supplies and stationery				
	1	Office supplies & stationery	Mont h	7	
	2	Computer stationery, toner, USB memory, CD, spares etc.	Mont h	7	
		Subtotal – O			
P	Telex, postage, courier and telephone charges				
	1	Telephone calls	Mont h	7	
	2	Fax	Mont h	7	
	3	Postage / Couriers	Mont h	7	
		Subtotal – P			
Q	Transport including running and maintenance				
	1	02 vehicle on rent (4WD)	Mont h	14	
	2	R&M of vehicle	Mont h	14	
		Subtotal – Q			
R	Non-technical / Work charged staff				

	1	Office assistant	Mont h	7		
	2	Chowkidar	Mont h	7		
	3	Caretaker	Mont h	7		
	4	Driver	Mont h	7		
		Subtotal – R		28		
S	Travelling and field allowances					
	1	Travelling	Mont h	7		
	2	Daily allowance for field staff trips	Mont h	7		
		Subtotal – S				
		Total Support Staff (H+R)		22 6		

7. QUALIFICATIONS AND EXPERIENCE OF CONSULTANT'S KEY PERSONNEL

Consultants key personnel should possess the qualifications and experience as mentioned below:

1. Project Manager / Team Leader

He/ She should at least be Master's Degree in Civil Engineering from a HEC / PEC recognized university. Ph.D. qualification in related engineering discipline shall be given additional weightage. The incumbent should have specific experience of working in senior techno-managerial position with at least 10 years as team leader on similar Projects. The incumbent should have minimum experience of 15 years with at least 8 years on similar assignments. The incumbent should be able to lead the team of Consultants and assist Irrigation Department in timely completion of the services with a quality output.

2. Expert (Geotechnical)

He/ She should have at least Master's Degree in Civil / Rock Mechanics / Geotechnical Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years' overall experience with minimum of 10 years in geotechnical discipline. The incumbent should have at least 7 years of working experience as Expert (Geotechnical).

3. Expert (Hydrology & Sedimentation)

He/ She should have at least Master's Degree in Civil / Hydrology or Water Resources Engineering from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years dam catchment hydrological calculations. The incumbent should have at least 7 years of working experience as Expert.

4. Expert (Electrical / Mechanical)

He/ She should have at least Master's Degree in Electrical/ Mechanical Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10

years on the similar projects / assignments. The incumbent should have at least 7 years of working experience as Expert (Electro-Mechanical).

5. Expert (Hydraulic Design)

He/ She should have at least Master's Degree in Hydraulic / Water Resource Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 20 years overall experience with minimum of 15 years on the similar projects / assignments. The incumbent should have at least 7 years of working experience as Expert (Hydraulic Design).

6. Expert (Dam Design)

He/ She should have at least Master's Degree in Civil / Dam or Geotechnical Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years on the similar projects / assignments. The incumbent should have at least 7 years of working experience as Expert (Dam Design).

7. Expert (Structure Design)

He/ She should have at least Master's Degree in related engineering discipline from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years on the similar projects / assignments. The incumbent should have at least 7 years of working experience as Expert (Structure Design).

8. Expert (Environment)

He/ She should have Master's Degree in Environmental Engineering/ Environmental Sciences from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with 10 years working on similar assignments / projects. The incumbent should have at least 7 years of working experience as Expert (Environment).

9. Expert (Resettlement)

He/ She should have Master's Degree in Social Sciences from a HEC/ PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with 10 years working on similar assignments / projects. The incumbent should have at least 7 years of working experience as Expert (Resettlement).

10. Expert (Construction Planning)

He/ She should have Master's Degree in Civil Engineering from a HEC / PEC recognized university. Ph.D. qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years' experience in Construction Planning assignments. The incumbent should have at least 7 years of working experience as Expert (Construction Planning).

11. Principal Geologist

He/ She should have Master's Degree in Geology / Rock Mechanics from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years' experience in related assignments.

12. Principal Electrical./ Mechanical Engineer


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He/ She should have Master's Degree in Electrical (with SCADA) / Mechanical Engineering from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years' overall experience with minimum of 10 years' experience in related assignments.

13. Principal Structure Design Engineer

He/ She should have Master's Degree in Civil Engineering / Structural Engineering from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years' overall experience with minimum of 10 years' experience in Hydro-Mechanical assignments.

14. Principal Reports / Documentation Engineer

He/ She should have at least Master Degree in Civil Engineering from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years overall experience with minimum of 10 years in related discipline.

15. Principal Contract Engineer

He/ She should have at least Master's Degree in Civil Engineering / Contract Management from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years' overall experience with minimum of 10 years in related discipline.

16. Principal Economist/Statistician

He/ She should have at least Master's Degree in Economics or statistics from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with minimum 10 years exposure to financial analysis / evaluation /projects monitoring in public sector.

17. Principal Sociologist

He/ She should have at least Master's Degree in Sociology from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least overall experience of 15 years with minimum 10 years' exposure on similar projects.

18. Principal Hydropower Engineer

He/ She should have Master's Degree in Hydropower Engineering from a recognized university. Higher qualification in related disciplines will be given additional weightage. The incumbent should have at least 15 years' overall experience with minimum of 10 years' experience in related assignments.

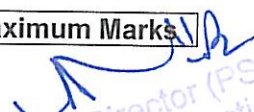
19. Geo Technical Engineer

He/ She should have Master's Degree in Civil Engineering (Geo Technical Engg) from HEC recognized University. The incumbent should have at least ten (10) years' general experience & 7 years relevant experience.

8. EVALUATION CRITERIA OF PROPOSALS

Proposals of the consultancy firms will be evaluated as under

S.No	Description	Maximum Marks
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A	Qualification & Experience of Technical Key Personnel	50
B	Experience of firm in undertaking Projects of dam & Hydraulic structures of similar nature & complexity	30
C	Work Plan/Manning Schedule & Methodology	20
	Total	100

Note.

- Each page of the proposal must be numbered, sealed & signed by the owner of firm
- Passing marks in each category will be 60%
- Proposals must be stippled binded. Ring binding will not be considered.
- Client reserves the right to make any change in TORs & marking criteria which is commonly applicable to all proposals
- Any observation/clarification required should be brought in notice of the Client / Employer before submission of the proposal during clarification meeting.
- Proposals shall be submitted in two copies (Marked as Original & Copy)
- Any mis-statement or false information provided in the technical or financial proposal will render the proposal as non-responsive and shall make the firm liable for punitive action under the relevant rules.

A. Qualification & Experience of Technical Key Personnel

ii. Marking criteria of Personnel

S.No	Description	Marks	Criteria
1	Qualification	20	As described against each Discipline
2	Languages	05	Pashto=2 (R W S) Urdu=1.5 (R W S) English=1.5 (R W S)
3	Experience	30	
	General Experience	7.5	Experience after completion of 16 Years education
	Relevant Experience	15	Experience of particular discipline
	Similar (DAM/Hydropower) Projects	7.5	Full marks for 5 Dams & 5 Hyrpower Projects
4	Experience of Local Environment	05	Khyber Pakhtunkhwa=03 Pakistan=02
	Total	60	Will be adjusted to 50

iii. This proforma must be available on top of each CV in addition to the information to be provided as per standard format of KPPRA/PEC, otherwise will not be considered.

1	2	3	4	5	6		
S#	Position	Proposed Personnel	Qualification	Knowledge of Languages	Experience		
					General	Relevant	Dam Projects
7	8	9					
Working Environment/Location	Cell No	Duration with firm					

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Note.

- The proposals must contain salary details, last degree, PEC registration certificates of the key staff
- Each CV must be signed in Original by the Personnel & owner of the firm.
- Personnel above the age of 70 will be in eligible

B. EXPERIENCE OF FIRM.

S.No	Description	Maximum Marks
A	Relevant/Specific Experience of Firm	
1	Completed/In progress Dam Projects in last 15 Years (07 Projects with Cost not less than 2500 Million (Construction Cost))	14 Feasibility Study= 25% marks, Detailed Design= 40% Marks, Procurement= 10% Marks Construction supervision= 25% Total= 100%
2	Completed Hydropower Projects in last 10 Years (03 Projects with Capacity not less than 15 MW)	6 Feasibility Study= 25% marks, Detailed Design= 40% Marks, Procurement= 10% Marks Construction supervision= 25% Total= 100%
B	General Experience of Firm	
1	Any completed Project of Civil Works in last 10 Years (Bridge, Barrages, Canals, Embankments) (05 Projects with Cost not less than 3000 Million (Construction Cost))	10 Feasibility Study= 25% marks, Detailed Design= 40% Marks, Procurement= 10% Marks Construction supervision= 25% Total= 100%

Note

- Award & completion documents must be available in support of projects claimed as experience
- Below proforma must be attached for any projects of claimed as experience in A & B along with all required documents, in addition to standard format.

1	2	3	4	5	6	7
S#	Name of Project	Location with Province & Country	Client	Address, Phone & Fax No of Client	Handled as: • Single Firm/ ; • Lead Firm/ ; • Joint Venture : Partner	Cost of Project
8	9	10		11		
Cost of Services	Scope of services • Feasibility • Detailed design • Procurement • Construction Supervision	Scope of Work				

UNDERTAKING

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It is hereby certified that the above are true statements based on facts and we take full responsibility for the correctness and accuracy of the information supplied herein to the best of our knowledge and belief. This is also to certify that the owner/partners/directors working solely for the consulting engineering profession. This is further to certify that we are independent consulting engineer and have no interest in any construction and conflicting commercial industrial and business activities which are likely to influence our professional independence and neutrality. We also undertake to fully abide by KPPRA act/rules & the Pakistan Engineering Council (Conduct and Practice of Consulting Engineers) Byelaws 1986 & registered with Khyber Pakhtunkhwa Revenue Authority

9. MODE OF PAYMENT. Mode of Payment will be on deliverables as per given details excluding cost of investigation from total approved cost, which will be paid as per actual.

S#	Description/Activity	%age payment of approved Cost
1	Upon Signing of Contract & establishment of offices	15%
2	Upon Submission of review report	10%
3	Upon Submission of Inception report	10%
4	Submission of Project Planning Report	10%
5	Submission of Land Acquisition PC-I	10%
6	Submission of LARP	5%
7	Submission of In term Design Report	5%
8	Submission of Draft Design Report,	10%
9	Submission of Draft bidding documents & Draft PC-I	5%
10	Submission of Final Design Report,	10%
11	Submission of final bidding documents & final PC-I	10%


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