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Kurram Tangi Dam Construction

Cultural Heritage Preservation Plan
Final Report

December, 2013
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Map to Kurram Tangi Dam Project Documents

Shown below is the suite of documents submitted to USAID under Contract AID-391-C-13-00002 for the KTDP. This report is shaded in red in order to show its relationship to the full set of documentation.

ENVIRONMENTAL ASSESSMENT	
	VOLUME I: MAIN REPORT
	VOLUME II: PROJECT ECONOMIC BENEFITS
	VOLUME III: MAPS
ENVIRONMENTAL MITIGATION AND MONITORING PLAN	
	MAIN REPORT
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KEY SUPPORTING TECHNICAL REPORTS	
	SUPPLEMENTAL REPORT ON GEOLOGY
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	SUPPLEMENTAL REPORT ON SEISMIC HAZARD
	SUPPLEMENTAL REPORT ON HYDROLOGY
	SUPPLEMENTAL REPORT ON CLIMATE CHANGE

All documents may be read as stand-alone documents, but the reader should be aware of the full set of documents available. Any one document may reference other documents in the suite in order to avoid duplication.

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Kurram Tangi Dam Construction
Cultural Heritage Preservation Plan

USAID Environmental Assessment of Kurram Tangi Dam Construction
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List of Acronyms

Acronym	Term
AOI	Area of Influence
APWA	All Pakistan Women Association
AHAP	Areas of High Archeological Potential
BCA	Before Command Area
CA	Command Area
CEDAW	Convention on the Elimination of Discrimination Against Women
CH	Cultural Heritage
CHPP	Cultural Heritage Preservation Plan
CE	Command Era
CFR	Code of Federal Regulations
CFRD	Concrete Faced Rockfill Dam
DEM	Digital Elevation Model
EA	Environmental Assessments
EIA	Environmental Impact Assessment
EMMP	Environmental Mitigation and Monitoring Plans
ESIA	Environmental and Social Impact Assessment
FATA	Federally Administered Tribal Areas
FCR	Frontier Crime Rate
FWF	Fatima Welfare Foundation
FWO	Frontier Works Organization
GAD	Gender and Development Framework
GCISC	Global Change Impact Study Center
GIS	Geographic Information System
GoP	Government of Pakistan
GPS	Global Positioning System
HDI	Human Development Index
IEE	Initial Environmental Examination
ICOLD	International Commission on Large Dams
ICOMOS	International Commission on Monuments and Sites
IUCN	International Union for Conservation of Nature
IWASRI	International Water Logging and Salinity Research Institute
IWMI	International Water Management Institute
JNT	Jawad Nazir Trust
KADO	Khushal Awareness and Development Organization
KPI	Key Performance Indicator
KP or KPK	Khyber Pakhtunkhwa
KTDC	Kurram Tangi Dam Consultants
KTDP	Kurram Tangi Dam Project
M and E	Monitoring and Evaluation
MDE	Maximum Design Earthquake
MMP	Mott MacDonald Pakistan
MWH	MWH Global, Inc. or MWH, Inc.

NCSW	National Commission on the Status of Women-Pakistan
NESPAK	National Engineering Services Pakistan
NEQS	National Environmental Quality Standards
NGO	Non-governmental Organization
OBE	Operating Basis Earthquake
OP	Operational Directive of the World Bank
PAP	Project Affected Persons
Pak-EPA or PEPA	Pakistan Environmental Protection Agency
PID	Provincial irrigation Department
PMD	Pakistan Meteorological Department
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PMS	Pakistan Meteorological Services
PSHA	Probabilistic Seismic Hazard Analysis
PCR	Physical Cultural Resources
RLACAP	Resettlement Land Acquisition and Compensation Action Plan
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
REA	Rapid Environmental Assessment
ROD	Road Open Day
SCF	Standard Conversion Factor
SEE	Safety Evaluation Earthquake
SSP	Soil Survey of Pakistan
SUPARCO	Pakistan Space and Upper Atmosphere Research Commission
SWM	Site Waste Management
SWR	Shadow Wage Ratio
TESCA	Tribal Area Electric Supply Corporation
TGP	Towards Gender Party
UET	University of Engineering and Technology
UN	United Nations
UNEP	United Nations Environment Program
USAID	United States Agency for International Development
USAID/Pak	United States Agency for International Development/Pakistan
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USG	United States Government
USGS	United States Geological Survey
WAPDA	Water and Power Development Authority
WWF-P	World Wide Fund for Nature – Pakistan

Definitions

Archaeological Site: A three-dimensional area that contains complex and concentrated physical evidence of human activity. Sites are defined by the presence of artifact and/or soil feature concentrations. These concentrations can be visible from the surface, but often require excavation to be seen and recorded. Sites can vary in size from a few meters for a burial site or lithic artifact scatter to 1 km or more for a settlement site. Some sites are defined by large-scale landscape features.

Artifact: Artifact is any portable object that is the product of human activity. Common examples include pottery or ceramics shards, glass fragments, stone tools, jewelry, and metal objects. Artifacts are different from naturally occurring objects and from features, which are artifacts that cannot be moved. Artifacts can include human, faunal, and botanical remains as well as in-organic materials.

Cultural heritage (CH) also referred to as ***physical cultural resources (PCR)****:* These are defined as "movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level or within the international community" (World Bank Group Operational Policy 4.11). In line with national and international standards Cultural Heritage has to be older than 100 years (i.e. established before 1913).

- **Monuments:** architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science;
- **Groups of buildings**: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science; and
- **Sites:** works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.

Evaluation: This is a level of intrusive site investigation designed to determine with relative certainty the basic characteristics, including the significance or level of importance, of a previously uninvestigated archaeological site. The results of an archaeological evaluation includes the definition of the vertical and horizontal extent of the site, the basic characteristics of its artifact assemblage, its stratigraphy and level of preservation, as well as the age, cultural affiliation(s) and type of site. Evaluations are more intensive than identification studies and less intensive than excavations.

Excavation: Refers to the process of systematically removing soil from an area to uncover artifacts, features, and stratigraphy. The soil is sieved through hardware mesh screens to recover small artifacts, which are placed in bags organized by soil level. Excavations can be small, such as a shovel test pit (50 cm x 50 cm), or large such as a 5 m x 5 m test unit or long narrow trenches to expose linear features. Excavation is usually performed by hand using trowel or shovel, though mechanical excavation can be utilized when large amounts of fill are present. Extensive notes and photographs are taken of the excavated area.

Feature: This is an artifact that usually cannot be removed from a site, such as a trash pit, foundation, or grave shaft. These artifacts are photographed and recorded in the field rather than removed. Some features are merely a pattern of soil discolorations.

Living Cultural Resource: These are cultural resources that have a close link to the contemporary populations and include places of worship, social functions and burial grounds in current use. In line with international best practice and national legislation, living cultural resources are only covered in this CHPP when they are older than 100 years. If they are younger, they are considered as communal resource or property and addressed in the Resettlement Policy Framework of Resettlement Action Plan.

Preservation in Place: This is the practice of avoiding impacts to a site altogether once it has been identified by implementing design changes to the original plans for the road, structure or canal. Preservation in place is the preferred method of preservation, and all attempts at site avoidance take place before excavations are begun. Preservation in place is not feasible for the dam and reservoir sites.

Site with Intangible Cultural Heritage Value (ICH): These are sites (sacred trees, stones hills etc.) that according to customs, traditions and beliefs make a people or a region distinctive and socially cohesive.

Stratigraphy: In archaeology, the presence of overlying layers of soil, thereby creating a sequential record of events in the ground. Each distinct soil layer, as described by color, texture, and size, is considered to be a stratum. Artifacts are recorded as to what stratum they are found in, indicating their relative age to one another. For example, artifacts in the upper layers were deposited after artifacts in lower layers. Usually, the upper layers are younger than the lower layers, but this is not always the case.

Cultural Heritage Preservation Plan

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EXECUTIVE SUMMARY

Pakistan is a country rich in cultural heritage. Research suggests that the Bannu plain as well as the Kurram and Kaitu Valleys have been inhabited since the Upper Palaeolithic Period (50'000-10'000 BCE). Due to limited accessibility hardly any serious archaeological work has been conducted in the project region with three exceptions: a) Sir Aurel Stein, who conducted rapid archaeological surveys in 1904 and 1927, b) some excavations by Prof Hassan Dani in the 1960ties and c) the Bannu Archaeological Project from 1985 and 2001 focusing on the Bannu plain. While "the known antiquarian remains … are scanty, … it appears … highly probable that the route which leads through the Kurram Valley must, owing to the great natural facilities it offers for communication between Kabul and the central part of the Indus Valley, have been one of considerable commercial and political importance in ancient times" (Stein 1905:7).

Pakistan has a comprehensive legislation on cultural heritage that is generally in line with international best practice such as the relevant World Bank's Policy (OP 4.11). The most relevant law is the **Antiquities Act 1975**. The Department of Archaeology and Museums has the deepest experience of any agency in country to conduct and supervise up-front identification and evaluation surveys as well as rescue excavation and late find procedures, but lacks resources, which will be provided by KTDP, if needed.

The objectives of this **Cultural Heritage Preservation Plan** (hereinafter CHPP) for the Kurram Tangi Dam Project (KTDP) are: a) to identify all cultural heritage sites potentially affected by the KTDP, b) to evaluate their significance, c) to avoid adverse impacts on significant cultural heritage resources where feasible, d) to minimize and/or mitigating any unavoidable impacts on high value cultural heritage sites in line with national and international legislation, e) to establish procedures to excavate all valuable cultural heritage sites that will be destroyed/damaged, and f) to build on existing institutional capabilities a comprehensive management plan to assure compliance with these objectives.

The Cultural Heritage Baseline was compiled from a desktop study that included a) literature review, b) analysis of satellite images (aerial archaeology) and c) consultations with experts, competent authorities etc. Field investigations and evaluations of identified sites that are normally performed as part of a CHPP were not performed due to the security situation in the Federally Administered Tribal Areas (Component One and Two) as well as the present status of engineering (i.e. before detailed design) for the canals and Command Areas in the Districts Bannu, Karak and Lakki Marwat (Component 3). To overcome this significant limitation, village meetings were used to obtain local information on a) known cultural heritage sites; b) preferences of how to deal with these sites; c) indications were remains have appeared during construction, plowing etc. and which could be unknown cultural heritage sites.

Impact Assessment

There is significant experience of what impact dams, reservoirs, canals and command areas have on cultural heritage sites: One lesson learned is that areas around dams and reservoirs have often proven to be conducive to early and sustained human settlements. Thus they are often rich in paleontological and archaeological material as well as sites of a religious and cultural connotation. In general dams and reservoirs are found to have a) large footprints of direct impacts that are mostly unavoidable, b) often underestimated footprint of indirect impacts related to the need to relocate communal infrastructure of cultural value, c) long term indirect impacts including downstream areas (reduced soil stability etc.) and upstream (higher water tables leading to erosion). The nature of the impact is basically that the cultural heritage is damaged/destroyed or made inaccessible i.e. submerged.

Impact Avoidance and Impact Mitigation

The preferred way to address any potential impacts is to avoid them through advanced planning and/or design changes. While avoidance can be accomplished rather easily for linear infrastructure i.e. by moving canals, roads, etc. to avoid sites in advance of construction or during construction (i.e. when important remains are identified as "late finds") such measures are unfeasible for dam sites, power houses, head works and reservoir area.

The preferred way to deal with unavoidable impacts is to excavate and study important sites and features prior to their disturbance/destruction and/or to relocate artifacts. This has been done with some success in other hydropower projects in Pakistan, but requires significant upfront work as historical site cannot be moved overnight. KTDP therefore commits to conduct the following actions as soon as possible:

- **Identification Survey and Classification**

Identification surveys and classification are normally conducted as part of the baseline study. However, in this case, this was not possible in Component One and Two for security reasons and for Component Three due to the early stage of engineering design. To overcome this shortcoming, KTDP will as soon possible but latest three months before the start of construction of a Subcomponent deploy experienced archaeologists to conduct

- systematic foot surveys including shovel test pits at sites of potential significance;
- in-depth discussions with key-informants in each settlement to follow up and validate information related to physical cultural resources.

- **Rerouting Procedure for Canals, Roads and Other Linear Infrastructure**

In case the identification survey detects one or more potentially high value cultural heritage directly located in the corridor earmarked for the canals, roads, transmission lines etc. and/or less than 20 m away from either side of them, KTDP will task qualified archeologists to conduct an evaluation to confirm/validate the exact value in close consultations with Department of Archaeology and Museums to determine whether the artifact/monument can be moved.

In case the evaluation study confirms that the cultural heritage is of high value and cannot be moved, KTDP will conduct an engineering feasibility study to inform whether a rerouting is possible and financial viable. In case the heritage is of high value and a rerouting is feasible, KTDP will reroute the infrastructure in order to avoid impacting high value cultural sites.

- **Rescue Work Procedure for Unavoidable Impacts**

Cultural property that cannot be avoided and that has been categorized as of moderate or high value will be subject of an archaeological evaluation in order verify the categorization and to assess whether the property can be moved or not. Based on these recommendations, KTDP will ask the Department of Archaeology and Museums to conduct excavations of all high value cultural heritage, to move all movable moderately and high value artifacts and to leave unmovable cultural heritage of moderate value and all cultural heritage of low value as they are. Following endorsement, KTDP will deploy experienced archaeologists to excavate all designated sites in line with international standards, establish a comprehensive documentation and transfer the archive including all artifacts to the Department of Archaeology and Museums.

- **Late Find Procedures**

Contracts for civil works are required to follow this late find procedure in case they encounter any movable or immovable objects and KTDP will deploy resident archaeologists to sensitize the workforce and be available at all time to verify whether a finding is of any significance. If a cultural resource comes to light during the works, the contractor shall stop the works in all areas 50 m around the discovery. After stopping work, the resident archaeologists shall identify and verify the finding, assess its significance and decide to either suspend work on this site and/or larger areas around it or to remove the finding (in case it is a easily movable object such as a coin etc.) and allow the work to continue. The contractor shall be entitled to claim compensation for this work suspension.

Monitoring and Evaluation: All cultural heritage work will be constantly monitored by the Department of Archaeology and Museum and periodically by an international cultural heritage specialist against the specifications outlined in this CHPP.

Roles and Responsibilities: KTDP is responsible for compliance with this CHPP while the responsibilities for implementation are divided between KTDP staff – here the Environmental and Social Cell (for upfront work and supervision), contractors (for the implementation of late find procedures) and the Department for Archaeology and Museums for Quality Assurance.

1 INTRODUCTION

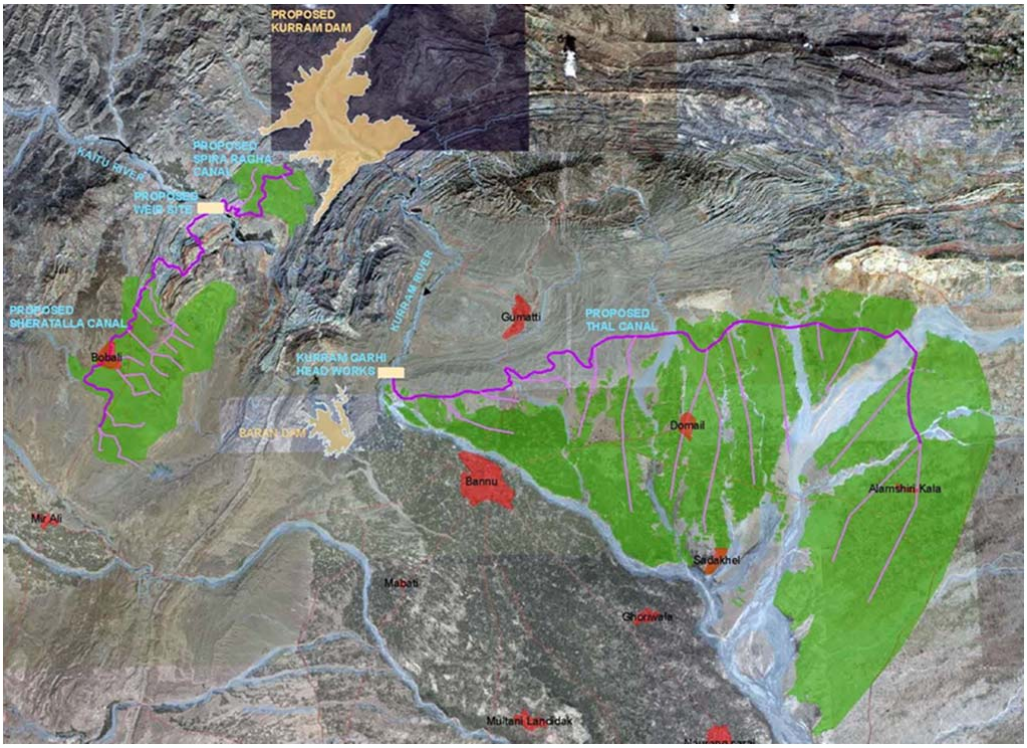
Pakistan is a country rich in cultural heritage[1]. Six of its cultural heritage sites have been inscribed on the UNESCO World Heritage list: the archaeological ruins of Moenjodaro, the Buddhist monuments of Takht-i-bahi and Sahr-i-Bahlol, Taxila, the Lahore Fort and the Shalamar Gardens as well as the historical monuments of Thatta and the Rohtas Fort. These monuments represent the most famous sites in Pakistan, still the number is surprisingly small amount given the country's rich history and strong cultural traditions It therefore is no surprise that Pakistan has established a comprehensive framework to identify, explore, excavate and research potential cultural heritage sites and to protect them against damages and adverse impacts (see chapter 4).

The objectives of this Cultural Heritage Preservation Plan (hereinafter CHPP) for the Kurram Tangi Dam Project (KTDP) are: a) to identify all cultural heritage potentially affected by the KTDP, b) to evaluate their significance, c) to avoid adverse impacts on significant cultural heritage resources where feasible, d) to minimize and/or mitigating any unavoidable impacts on high value cultural heritage in line with national and international legislation, e) to establish procedures to excavate all valuable cultural heritage sites that will be destroyed, and f) to build on existing institutional capabilities a comprehensive management plan to assure compliance with these objectives.

This CHPP therefore:

- Provides an introduction to the history of the area potentially affected by KTDP;
- Identifies and classifies all known cultural heritage sites potentially affected by the KTDP;
- Identifies potential impacts;
- Outlines processes and procedures to conduct identification studies, evaluations and excavations before construction/filling of the reservoir;
- Details the field work to be conducted in the context of the KTDP; and,
- Establishes a management plan for potentially affected cultural heritage resources.

Figure 1-1: Location of Project Components



[1] Physical cultural resources, cultural heritage, and cultural patrimony are all synonymous terms.

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2 PROJECT DESCRIPTION AND AREA OF IMPACT

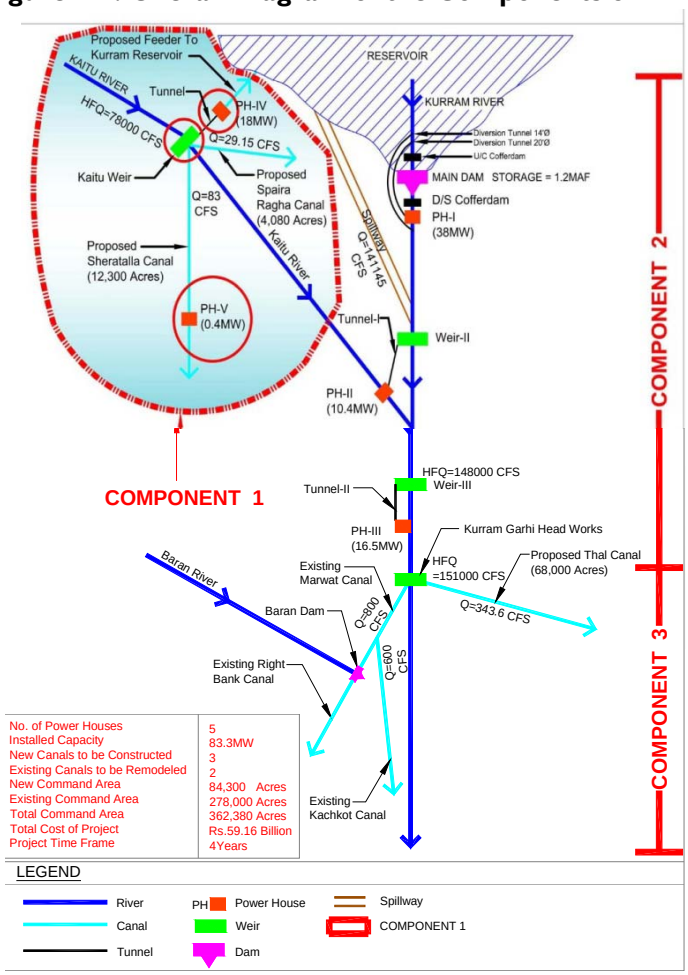
2.1 Project Description

KTDP aims: i) to increase agricultural production in one of the most underdeveloped regions of Pakistan through the comprehensive development of available land and water resources by establishing new canals and command areas, remodelling and/or improving existing ones and ii) to generate hydropower, through the construction of two dams, a weir on the Kaitu River and subsequently a large dam on the Kurram Tangi river.

The KTDP will be implemented in three stages over at least 10 years, as follows:

- **Component 1**, Tribal Area Development, will build a weir on the Kaitu River for hydropower and irrigation of two proposed perimeters, Spira Ragha to the north and Sheratalla to the south. The Component includes also two powerhouses (IV and V), canals, transmission lines and roads linking these elements as well as a transmission line from powerhouse 4 to the Domail substation near Bannu. These investments are scheduled to commence in 2014.
- **Component 2,** Kurram Tangi Dam, will build a large dam and two smaller dams on the Kurram Tangi River for electricity and irrigation purposes.
- **Component 3,** Irrigation Development, will move water from the Kurram Tangi reservoir to existing and new Command Areas in the Bannu plains.

Figure 2-1: Overall Diagram of the Components of KTDP



The KTDP will impact five districts/areas in North West Pakistan: i) North Waziristan, ii) Frontier Region Bannu, iii) Bannu District, iv) Lakki Marwat and v) Karak. The first two are located in the

Federally Administered Tribal Area (FATA), the last three in the settled areas of the Khyber Pakhtunkhwa Province (KP). Thus, Components 1 and 2 with the exception of minor parts of the access roads and transmission line lie in the FATA, while, Component 3 plus minor parts of the access roads and the transmission line of Components 1 and 2 are located in the Districts of Bannu, Lakki-Marwat and Karak.

2.1.1 Component 1: Tribal Area Development

Component 1 involves the construction of Kaitu Weir, Sheratalla Canal System, Spaira Ragha Canal System, Feeder Tunnel, Pump Stations, Powerhouse IV, Powerhouse V and other ancillary works such as roads and transmission lines. While WAPDA is the overall implementing agency, the tertiary canals and the development of the Command Areas will be done by the FATA Irrigation Department, the transmission lines will be done by the Peshawar Electric Supply Company (PESCO) and road construction by the Works and Service Department of the FATA.

Kaitu Weir: A weir will be constructed on the Kaitu River about 400 feet upstream of the Mirali - Thal Road Bridge, and about 17.5 miles upstream of the confluence of the Kaitu and Kurram Rivers. The weir forms a pool of water facilitating the diversion of water to irrigation canals and to the Kurram Tangi Dam Reservoir via Powerhouse IV. In addition, the weir provides a means to safely pass Kaitu flood during monsoon.

Sheratalla and Spaira Ragha Irrigation Canals: From the Kaitu Reservoir, there will be two separate off-takes for the Sheratalla and Spaira Ragha Canals. The proposed Sheratalla Canal will irrigate a Command Area of 12,300 acres, while the proposed Spaira Ragha Canal will irrigate 4,080 acres.

The proposed Spaira Ragha Canal System, located on the left bank of the Kaitu River, will comprise concrete lined gravity and lift channels provided with regulating structures, cross drainage structures, bridges, culverts, escape structures and outlets. This canal divides into two canals, one of which will have a 55-foot lift and a pumping station using electricity produced from Powerhouse V to feed water to the lift minor of the Spaira Ragha Canal. The pumping station will comprise a pump house, five electric pumping sets and ancillary electrical and mechanical works.

The proposed Sheratalla Canal System on the right bank will comprise eight distributaries, seven minors and sub-minors, regulating structures including head regulators, cross drainage structures, bridges, escape structures and outlets.

The canals will have differing sizes at various segments but will have a trapezoidal shape and will have a concrete lining throughout. The construction of the primary and secondary canals will be done by WAPDA while the tertiary canals will be constructed by the Irrigation Department.

Powerhouse IV: There will be a third off-take from the Kaitu Reservoir to provide water for a powerhouse located in the Kurram River watershed. A sediment excluder is provided at the beginning of the waterway. This 60-ft wide and 120-ft long concrete structure allows the suspended sediment to settle out before entering the feeder channel. Water then travels through a 950-ft long feeder channel leading to a 14-ft diameter feeder tunnel excavated under the high mountain located in the left bank of the Kaitu River. The 6,100-ft long tunnel is followed by a 15,000-ft long headrace channel and a 900-ft steel penstock culminating in Powerhouse IV. A short tailrace channel will discharge water from the powerhouse to the Kurram Tangi Dam Reservoir. Powerhouse IV and associated waterways thus facilitate the diversion of Kaitu River flows in excess of irrigation requirements at the Spira Ragha and Sheratalla systems and the downstream minimum release for storage in Kurram Tangi Dam and generate a maximum of 18 MW of hydropower.

A new 30 miles long 132-kV transmission line will connect the Powerhouse IV switchyard to the existing substation at Domail near Bannu, where power will be delivered into the national grid.

Powerhouse V: A small powerhouse will be constructed along the Sheratalla Canal to provide electricity to operate the pump facilities. Water will be conveyed to the surface type powerhouse via a waterways system consisting of a feeder tunnel, headrace channel and two parallel penstocks. A

new 11-kV transmission line will connect the Powerhouse V switchyard to the Spaira Ragha Canal Pumping Station via the Kaitu Weir. The 11 kV transmission line will have poles every 200 ft.

Construction Phase

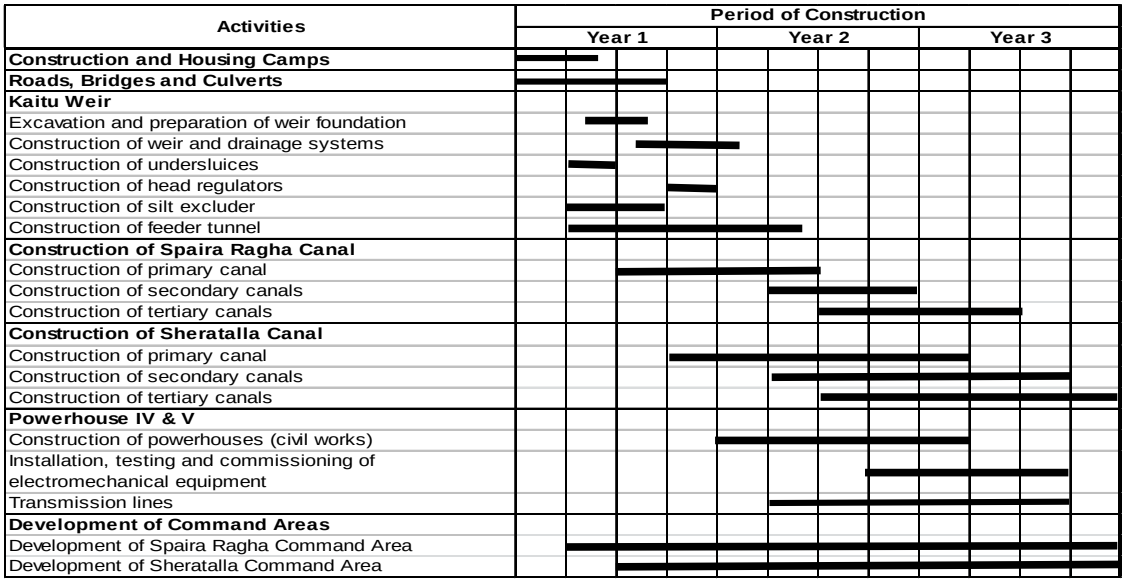
Access Roads: The Mirali-Thal Road and the bridges along the road will be upgraded to make them suitable for handling the design loads required to transport the heavy piece of equipment used in the Project. The Spinwam Bridge, especially, will be inspected for soundness. If its design loading is found to be insufficient to carry heavy-load construction vehicles, the existing ford downstream could be modified with the addition of a concrete slab crossing.

The Bannu-Thal road will also be used as a main access road to link with the Mirali-Thal road and to provide transportation from Bannu to all the proposed facilities within Component I. Prior to start of construction, the construction contractor will further assess and upgrade - under the supervision of the Works and Service Department of the FATA - the Bannu-Thal road and bridges along the road to make them suitable for handling the design loads required to transport the heavy piece of equipment used in the Project.

Plate 2-1: A road in the area of the proposed Sheratalla canal

Construction Phase and Schedule

Figure 2-2: Construction Schedule for Component I



It is expected that construction of Component I will take about 3 years, but this would require that the three implementing agencies (WAPDA, PEPCO and FATA Department for Irrigation) work hand

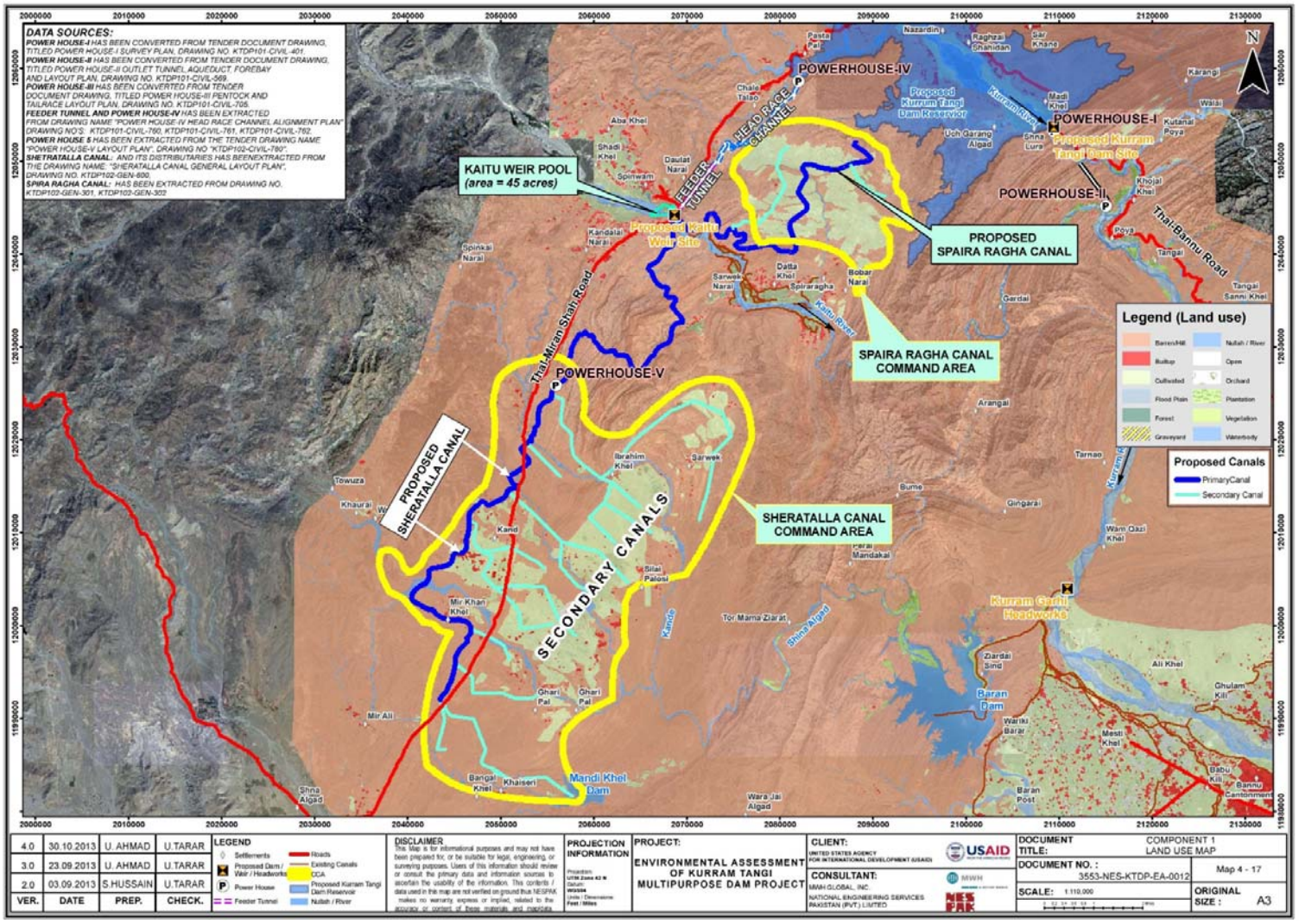
in glove to assure for example that the secondary canals deliver water where it can be linked into tertiary canals most effectively.

Construction Camps: The construction camp facilities specific have yet to be defined. It is a requirement in the existing Tender Documents for the construction contractor to decide on the most appropriate locations. WAPDA mentioned recently the possibility of using an old army base located on the left bank of the Kaitu River, upstream of the proposed Kaitu weir site. This base could be used as the Headquarters for the construction contractor but most likely it will not be large enough for a full construction camp.

For both canals, it is can be assumed that the construction crews will live in tents along the right-of-way, provided with food, water, fuel and other amenities from the central camp near the weir. For the tunnel, powerhouse, and ancillary structures of Powerhouses IV and V, site accommodations for construction crews of about 100 workers and supervisors will be required.

Operation Phase**.** The Kaitu Weir will be operated to provide water to the Sheratalla and Spaira Ragha canals, after the release of enough flow to ensure the ecological conditions of the downstream channel and the irrigation and domestic water needs of the Datta Khel population complex. The combined design release to the two canals will be 116.5 cfs. Additional incoming flows above these amounts, up to 1,200 cfs, will be discharged through the diversion tunnel and powerhouse IV to the Kurram River.

Presently no operations philosophy and/or management plan has been developed and it is therefore unclear how water resources will be managed to strike a balance between the three main interest groups: a) WAPDA for Hydropower Generation, b) people using land in the Spaira Ragha and Sheratalla Command Areas and c) downstream users of water resources in and around Datta Khel. Similarly, no decommissioning strategy has been developed to inform what happens during or after decommissioning to the resources and assets established by Component 1.


DATA SOURCES:
POWER HOUSE-I HAS BEEN CONVERTED FROM TENDER DOCUMENT DRAWING, TITLED POWER HOUSE-I SURVEY PLAN, DRAWING NO. KTDP101-CIVIL-401.
POWER HOUSE-II HAS BEEN CONVERTED FROM TENDER DOCUMENT DRAWING, TITLED POWER HOUSE-II OUTLET TUNNEL, AQUEDUCT, FOREBAY AND LAYOUT PLAN, DRAWING NO. KTDP101-CIVIL-569.
POWER HOUSE-III HAS BEEN CONVERTED FROM TENDER DOCUMENT DRAWING, TITLED POWER HOUSE-III PENTOCK AND TAILRACE LAYOUT PLAN, DRAWING NO. KTDP101-CIVIL-705.
FEEDER TUNNEL AND POWER HOUSE-IV HAS BEEN EXTRACTED FROM DRAWING NAME "POWER HOUSE-IV HEAD RACE CHANNEL ALIGNMENT PLAN" DRAWING NO'S: KTDP101-CIVIL-760, KTDP101-CIVIL-761, KTDP101-CIVIL-762.
POWER HOUSE 5 HAS BEEN EXTRACTED FROM THE TENDER DRAWING NAME "POWER HOUSE-V LAYOUT PLAN", DRAWING NO "KTDP102-CIVIL-780".
SHETRATALLA CANAL: AND ITS DISTRIBUTARIES HAS BEENEXTRACTED FROM THE DRAWING NAME: "SHERATALLA CANAL GENERAL LAYOUT PLAN", DRAWING NO. KTDP102-GEN-800.
SPIRA RAGHA CANAL: HAS BEEN EXTRACTED FROM DRAWING NO. KTDP102-GEN-301, KTDP102-GEN-302
KAITU WEIR POOL
(area = 45 acres)
Proposed Kaitu Weir Site
FEEDER TUNNEL
HEAD RACE CHANNEL
POWERHOUSE-IV
POWERHOUSE-I
POWERHOUSE-II
POWERHOUSE-V
Proposed Kurram Tangi Dam Reservoir
Proposed Kurram Tangi Dam Site
PROPOSED SPAIRA RAGHA CANAL
SPAIRA RAGHA CANAL COMMAND AREA
SHERATALLA CANAL COMMAND AREA
PROPOSED SHERATALLA CANAL
SECONDARY CANALS
Thal-Miran Shah Road
Thal-Bannu Road
Kurram River
Kaitu River
Kurram Garhi Headworks
Baran Dam
Mandi Khel Dam
Legend (Land use)
Proposed Canals
PrimaryCanal
Secondary Canal
N
DOCUMENT TITLE: COMPONENT 1 LAND USE MAP
DOCUMENT NO. : 3553-NES-KTDP-EA-0012
Map 4 - 17
SCALE: 1:110,000
ORIGINAL SIZE : A3
PROJECT: ENVIRONMENTAL ASSESSMENT OF KURRAM TANGI MULTIPURPOSE DAM PROJECT
CLIENT: USAID
CONSULTANT: MWH GLOBAL, INC. / NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED
PROJECTION INFORMATION
DISCLAIMER
LEGEND
4.0 30.10.2013 U. AHMAD U.TARAR
3.0 23.09.2013 U. AHMAD U.TARAR
2.0 03.09.2013 S.HUSSAIN U.TARAR
VER. DATE PREP. CHECK.

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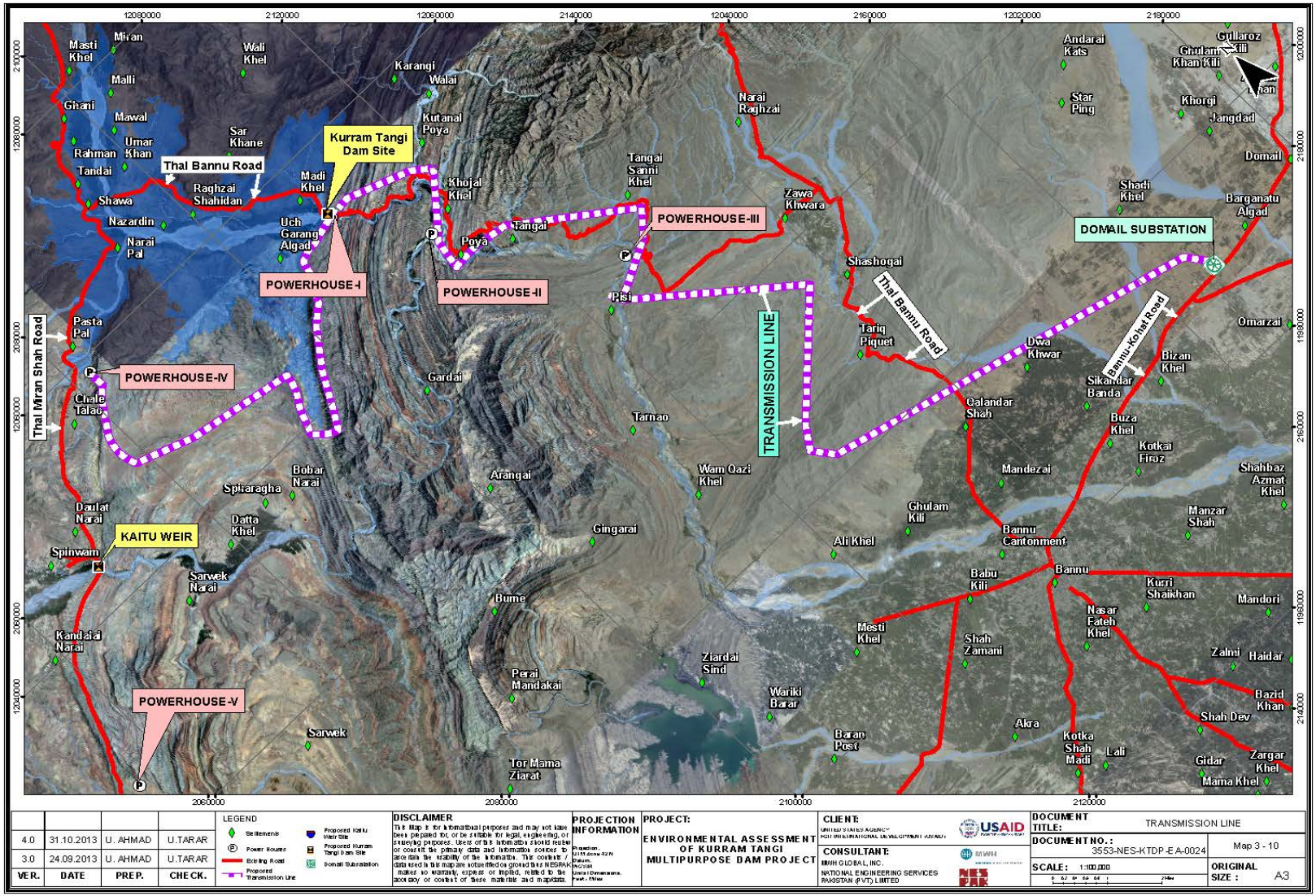
Kurram Tangi Dam Site
Thal Bannu Road
Thal Miran Shah Road
POWERHOUSE-I
POWERHOUSE-II
POWERHOUSE-III
POWERHOUSE-IV
POWERHOUSE-V
TRANSMISSION LINE
DOMAIL SUBSTATION
KAITU WEIR
Bannu-Kohat Road
Masti Khel
Miran
Wali Khel
Karangi
Walai
Andarai Kats
Gularoz Kili
Ghulam Khan Kili
Star Ping
Khorgi
Jangdad
Domail
Ghani
Malli
Mawal
Sar Khane
Kutanal Poya
Narai Raghzai
Rahman
Umar Khan
Tandai
Raghzai Shahidan
Madi Khel
Khojal Khel
Tangai Sanni Khel
Zawa Khwara
Shadi Khel
Barganatu Algad
Shawa
Nazardin
Narai Pal
Uch Garang Algad
Tangai
Poya
Shashogai
Pisi
Tariq Piquet
Omarzai
Pasta Pal
Chale Talao
Gardai
Tarnao
Dwa Khwar
Bizan Khel
Sikandar Banda
Qalandar Shah
Buza Khel
Kotkai Firoz
Mandezai
Shahbaz Azmat Khel
Bobar Narai
Spiraragha
Arangai
Wam Qazi Khel
Daulat Narai
Datta Khel
Gingarai
Ghulam Kili
Manzar Shah
Spinwam
Ali Khel
Bannu Cantonment
Sarwek Narai
Bume
Babu Kili
Bannu
Kurri Shaikhan
Mandori
Nasar Fateh Khel
Kandalai Narai
Mesti Khel
Shah Zamani
Zalni
Haidar
Ziardai Sind
Perai Mandakai
Wariki Barar
Bazid Khan
Shah Dev
Sarwek
Akra
Baran Post
Kotka Shah Madi
Lali
Gidar
Zargar Khel
Mama Khel
Tor Mama Ziarat
2060000
2080000
2100000
2120000
LEGEND
Settlements
Power Houses
Existing Road
Proposed Transmission Line
Proposed Kaitu Weir Site
Proposed Kurram Tangi Dam Site
Domail Substation
DISCLAIMER
This Map is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the validity of the information. This contains data sourced in the map are notified on ground by NESPAK makes no warranty, express or implied, related to the accuracy or content of these materials and map data.
PROJECTION INFORMATION
Projection: UTM Zone 42N
Datum: WGS84
Units: Dimensions: Feet, Miles
PROJECT:
ENVIRONMENTAL ASSESSMENT OF KURRAM TANGI MULTIPURPOSE DAM PROJECT
CLIENT:
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)
USAID
CONSULTANT:
MWH GLOBAL, INC.
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
NESPAK
DOCUMENT TITLE: TRANSMISSION LINE
DOCUMENT NO.: 3553-NES-KTDP-EA-0024
Map 3 - 10
SCALE: 1:100,000
ORIGINAL SIZE: A3
4.0 31.10.2013 U. AHMAD U.TARAR
3.0 24.09.2013 U. AHMAD U.TARAR
VER. DATE PREP. CHECK.

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2.1.2 Component 2: Kurram Tangi Dam

The basic purpose of the proposed Kurram Tangi Dam is the storage of water for irrigation and power generation. At present, up to 50 percent of the flows from the Kurram River are underutilized, as there is a lack of storage capacity within the river basin. By constructing the proposed Kurram Tangi Dam, flows from the Kurram River will be regulated through the dam and reservoir and water will be released according to the irrigation requirements and downstream user demands, while the excess water will be stored for use during low flow periods. The Kurram Tangi Dam will also store excess water from the Kaitu River basin that will be diverted via a diversion tunnel. A main powerhouse, with an installed capacity of 38 MW, is proposed at the foot of dam, and two additional powerhouses with capacities of 10.4 and 16.5 MW are proposed between the Kurram Tangi Dam and Kurram Garhi Headworks.

Main Dam: This will be a rockfill (or an earth/rockfill) dam with a concrete face slab over the upstream slope. The face slab is between 0.25 and 0.6 m thick, with vertical and horizontal joints to accommodate deformation which occurs during construction and when the water load is applied.

Main Dam Roadways: Improvements to existing roads and construction of new roads will be required for construction of the main dam to allow for heavy vehicles and increased traffic during the construction phase. The roadway from Bannu to Mirali to Spinwam will require improvements. The distance along existing road from Bannu to Mirali is 21 miles and from Mirali to Spinwam is 28 miles. The carriageway from Bannu to Mirali to Spinwam is 20 ft wide paved track with shoulders of 5 ft on each side. The total width of the carriageway is 30 ft. Generally the condition of the bridges and the road is not in very good conditions. Most of the bridges are designed for 12 ton loading, which meets the requirement. However, improvement of the existing road is needed.

The construction of a new access road from Spinwam to the main dam will be needed. This new proposed road will take off from the Mirali-Thal Road at Spinwam near Kaitu River Bridge and follow the route along the proposed Spaira Ragha irrigation canal and subsequently the periphery of the reservoir. It will be 9 miles in length, of which about 4 miles will be in the Spaira Ragha Plain without involving rock excavation and 5 miles will require rock excavation. It does not involve any bridge construction. The elevation varies from 2,115 to 2,345 ft. The proposed road width is 30 ft with 20 ft paved and 5 ft shoulders on either side.

Kurram Tangi Reservoir: The proposed Kurram Tangi Reservoir will be used mainly to meet irrigation needs of the existing Civil Canals, Marwat Canal and the new Command area in Thal Plain. Water from the reservoir will also be used to generate electrical power and released back to the Kurram River. These releases will reach Kurram Garhi Headworks, at River Mile 56, after passing through the main powerhouse (Powerhouse I) and the two powerhouses located in between the Kurram Tangi Dam and Kurram Garhi Headworks (Powerhouses II and III). At the Kurram Garhi Headworks water will be diverted to the respective canals as per their requirements and quotas. Filling of the reservoir will submerge part of the existing road from the Mirali-Thal Road near Shewa Post; therefore the construction of a new roadway will be required. The length of the new road will be 6 miles with a 30 ft carriage way and a 20 ft paved surface, and will involve the construction of two bridges.

Kurram Tangi Spillway: The spillway is proposed to be located on the right bank of the Kurram River at River Mile 67. The main features of the spillway were established during the feasibility study. The spillway and its various components include piers, a bridge, guide walls, chute, and stilling basin. The spillway and its various components were designed to safely pass the Probable Maximum Flood (PMF). The spillway capacity at Kurram Tangi Dam is being fixed so that the flood surcharge due to the PMF including wave-run-up would be lower than the top of the dam. The spillway is capable of passing the PMF, with normal flood surcharge 5.8 ft above normal reservoir level. The spillway will be 200 ft wide, having four bays, and the energy will be dissipated through a 300 ft long by 200 ft wide spillway with chute blocks.

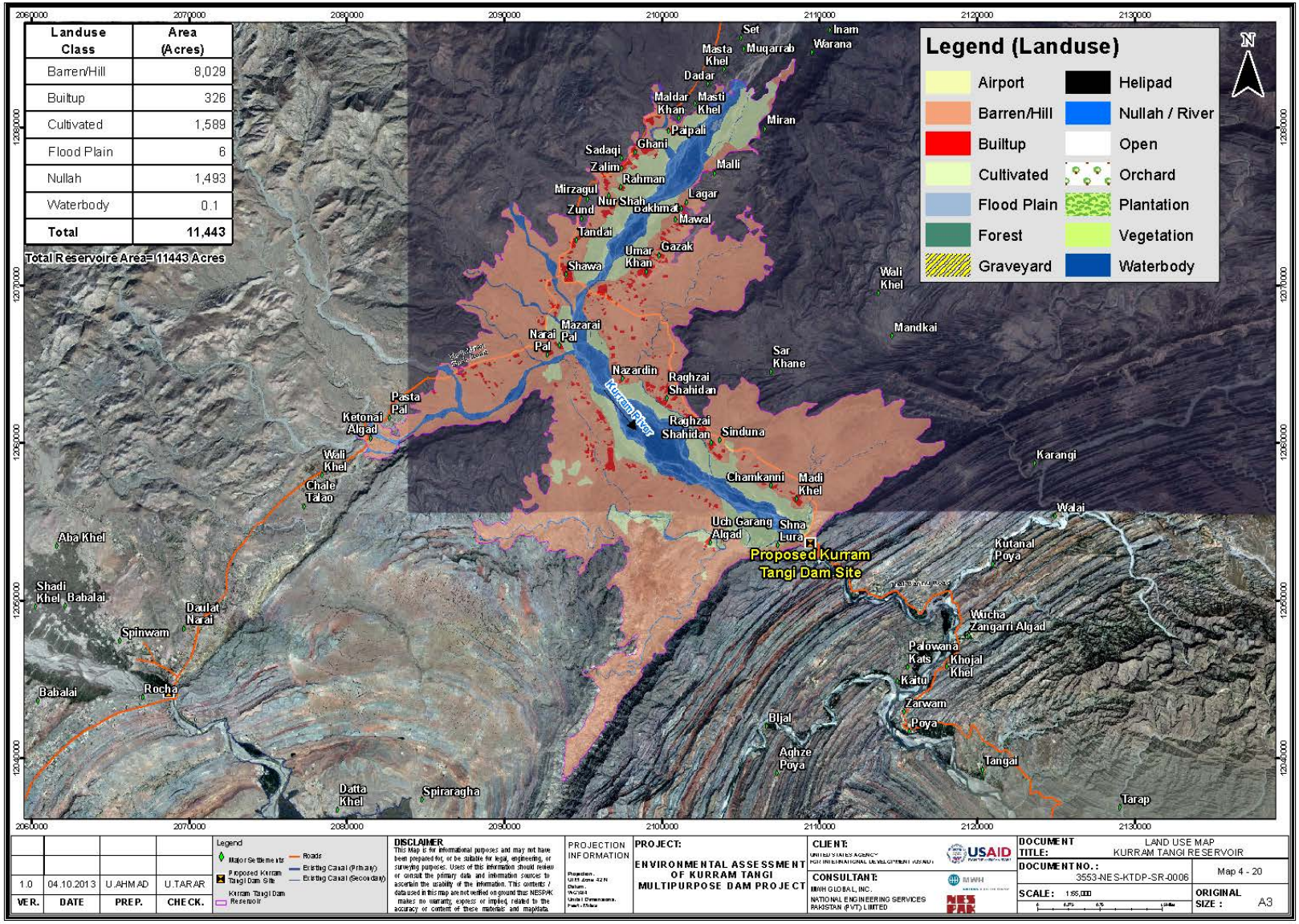
Diversion Tunnels: Two diversion tunnels, one of 20 ft diameter and the other of 14 ft diameter, will be constructed on the right bank of the Kurram River between the dam and the spillway. The 20 ft diameter tunnel will be used later as power tunnel for the main powerhouse, located at the foot of dam. The length of the power tunnel, including the intake portal, is 1,013 ft and it will lead to Powerhouse 1. The 14-ft-diameter tunnel will be used as a low-level outlet for providing irrigation water during the initial few years after construction of dam, as during these years, the river flows may be just close to irrigation requirements. Following this period, the 14-ft-diameter tunnel will be plugged with a bulk head gate. In addition, this tunnel would be used for flushing of sediments.

Weirs II and III: There will be two weirs along the Kurram River downstream of the Kurram Tangi dam to create small reservoirs for power generation. Weir II will be located approximately 8,000 ft downstream of the main dam at River Mile 65.5, used to divert water to Powerhouse II, and will be 418 ft long and 20 ft high. For control of seepage and uplift pressures, a slurry trench cutoff tied to the bedrock has been provided under the structure. Additionally relief wells at 25 ft spacing have also been provided through a 5 x 7 ft gallery located in the structure. Weir III will also be located along Kurram River, about 30,000 ft downstream of the main dam at River Mile 61. Weir III will be 1,190 ft long and 75 ft high. The downstream face of the weir has been provided with a cascade type of chute for dissipation of energy. The chute will terminate in a stilling basin 62.0 ft. long. Two low level conduits of 12.0 ft. diameter, which will initially be used for river diversion, have been provided in the weir for the sluicing of sediments. These conduits will have vertical gates at upstream, operated from the crest of the weir.

Powerhouses I, II, and III. Three powerhouses are proposed:

- Powerhouse 1, the main powerhouse, will be located at the toe of the dam on the right bank of Kurram River, at River Mile 67, and have an installed capacity of 38.0 MW. The size of the semi-surface powerhouse was determined after dimensioning the spiral case, draft tube and generator dimensions. The total length and width of the powerhouse including the loading bay and control building have been determined to be 180 ft long and 111 ft wide, having galleries on the upstream and downstream sides for positioning the electrical and mechanical equipment.
- Powerhouse II will be located 2.1 miles downstream of the dam, or roughly 0.17 miles from the confluence of Kaitu and Kurram Rivers, and will have an installed capacity of 10.4 MW. It will be constructed downstream of the main dam to utilize the natural slope of Kurram River by bypassing a bend in it. The tunnel will be connected to penstock through a forebay for conveying water to the powerhouse.
- Powerhouse III will be located 4.8 miles downstream of Powerhouse II, at River Mile 60, and have an installed capacity of 16.5 MW. Powerhouse III will be constructed on right bank of Kurram River. The size of the power station, which would basically be a semi-surface powerhouse, was determined after dimensioning the spiral case, draft tube and generator dimensions. A 16 ft wide, 3,250 ft long horse shoe shaped tunnel will convey water to the powerhouse. The total length and width of the powerhouse including the loading bay have been determined as 145 ft long and 105 ft wide, having a downstream gallery for disposition of the electrical equipment. The powerhouse building will be a reinforced concrete structure. The powerhouse has also been provided with an under-drainage system to take care of seepage and uplift pressures. This under-drainage system will comprise horizontal and vertical drains. It is also proposed to conduct consolidation grouting of foundations before erecting the structure.

The three powerhouses will be connected to the new transmission line to the existing substation at Domail that will be built as part of Component 1.


Landuse Class | Area (Acres)
Barren/Hill | 8,029
Builtup | 326
Cultivated | 1,589
Flood Plain | 6
Nullah | 1,493
Waterbody | 0.1
Total | 11,443
Total Reservoire Area= 11443 Acres
Legend (Landuse)
Airport
Barren/Hill
Builtup
Cultivated
Flood Plain
Forest
Graveyard
Helipad
Nullah / River
Open
Orchard
Plantation
Vegetation
Waterbody
N
Kurram River
Proposed Kurram Tangi Dam Site
Set
Inam
Warana
Masta Khel
Muqarrab
Dadar
Maldar Khan
Masti Khel
Miran
Paipali
Sadaqi
Ghani
Zalim
Malli
Rahman
Mirzagul
Nur Shah
Lagar
Zund
Bakhmat
Mawal
Tandai
Gazak
Umar Khan
Shawa
Wali Khel
Mandkai
Mazarai Pal
Narai Pal
Sar Khane
Nazardin
Raghzai Shahidan
Pasta Pal
Ketonai Algad
Raghzai Shahidan
Sinduna
Wali Khel
Karangi
Chale Talao
Chamkanni
Madi Khel
Walai
Uch Garang Algad
Shna Lura
Aba Khel
Kutanal Poya
Shadi Khel
Babalai
Daulat Narai
Wircha Zangarri Algad
Spinwam
Palowana Kats
Khojal Khel
Kaitul
Babalai
Rocha
Zarwam
Poya
Bijal
Aghze Poya
Tangai
Datta Khel
Spiraragha
Tarap
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70000
60000
50000
40000
30000
20000
10000
0
Legend
Major Settlements
Proposed Kurram Tangi Dam Site
Kurram Tangi Dam Reservoir
Roads
Existing Canal (Primary)
Existing Canal (Secondary)
DISCLAIMER
This Map is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This contents / data used in this map are not verified on ground thus NESPAK makes no warranty, express or implied, related to the accuracy or content of these materials and maps/data.
PROJECTION INFORMATION
Projection: UTM Zone 42N
Datum: WGS84
Units / Dimensions: Feet / Meters
PROJECT:
ENVIRONMENTAL ASSESSMENT OF KURRAM TANGI MULTIPURPOSE DAM PROJECT
CLIENT:
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)
USAID
CONSULTANT:
MWH GLOBAL, INC.
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
NESPAK
DOCUMENT TITLE: LAND USE MAP KURRAM TANGI RESERVOIR
DOCUMENT NO.: 3553-NES-KTDP-SR-0006
Map 4 - 20
SCALE: 1:85,000
ORIGINAL SIZE : A3
VER. | DATE | PREP. | CHECK.
1.0 | 04.10.2013 | U.AHMAD | U.TARAR

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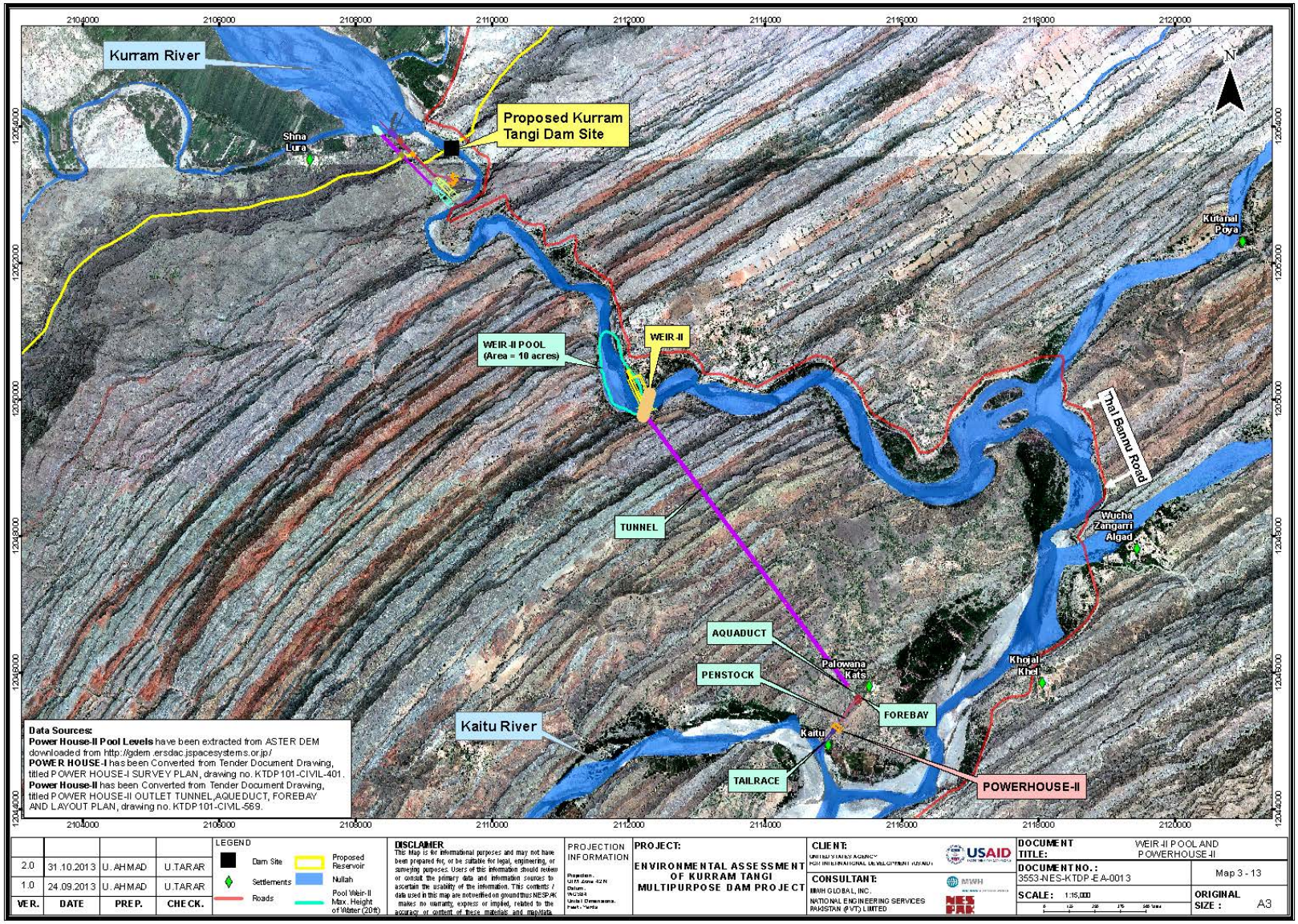
Kurram River
Proposed Kurram Tangi Dam Site
Shna Lura
Kutanal Poya
WEIR-II POOL (Area = 10 acres)
WEIR-II
Thal Bannu Road
Wucha Zangarri Algad
TUNNEL
AQUADUCT
PENSTOCK
Palowana Kats
FOREBAY
Khojal Khel
Kaitu River
Kaitu
TAILRACE
POWERHOUSE-II
N
Data Sources:
Power House-II Pool Levels have been extracted from ASTER DEM downloaded from http://gdem.ersdac.jspacesystems.or.jp/
POWER HOUSE-I has been Converted from Tender Document Drawing, titled POWER HOUSE-I SURVEY PLAN, drawing no. KTDP101-CIVIL-401.
Power House-II has been Converted from Tender Document Drawing, titled POWER HOUSE-II OUTLET TUNNEL,AQUEDUCT, FOREBAY AND LAYOUT PLAN, drawing no. KTDP101-CIVIL-569.
VER. DATE PREP. CHECK.
2.0 31.10.2013 U.AHMAD U.TARAR
1.0 24.09.2013 U.AHMAD U.TARAR
LEGEND
Dam Site
Settlements
Roads
Proposed Reservoir
Nullah
Pool Weir-II Max. Height of Water (20ft)
DISCLAIMER
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PROJECTION INFORMATION
PROJECT:
ENVIRONMENTAL ASSESSMENT OF KURRAM TANGI MULTIPURPOSE DAM PROJECT
CLIENT:
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)
USAID
CONSULTANT:
MWH GLOBAL, INC.
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED
DOCUMENT TITLE: WEIR-II POOL AND POWERHOUSE-II
DOCUMENT NO.: 3553-NES-KTDP-EA-0013
Map 3 - 13
SCALE: 1:15,000
ORIGINAL SIZE : A3

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Construction Phase and Schedule

Figure 2-3: Construction Schedule for Component 2

Item No.	Activities	Period of Construction			
		Year 1	Year 2	Year 3	Year 4
1	**Construction and Housing Camps**				
2	**Roads, Bridges and Culverts**				
3	**Main Dam**				
3.1	**Diversion works**				
3.2	**Main Dam**				
3.2.1	Construction of U/S cofferdam				
3.2.2	Dewatering of dam foundation				
3.2.4	Preparation of dam foundation				
3.2.5	Main dam placement and compaction				
3.2.6	Laying down the concrete Pad				
3.2.7	Anchoring				
3.2.8	Consolidation and grouting @ 10' C/C				
3.2.9	Curtain grouting				
3.2.10	Laying of u/s concrete slab				
3.2.11	Construction of parapet wall				
3.2.12	Instrumentation				
3.2.13	Instrumentation house				
3.3	**Spillway and Other Structures**				
3.3.1	Construction of d/s cofferdam				
3.3.2	Excavation of spillway approach channel and weir				
3.3.3	Excavation of chute and stilling basin				
3.3.4	Construction of spillway weir				
3.3.5	Construction of chute and stilling basin				
3.3.6	Spillway gate installation				
3.3.7	Spillway deck				
3.3.8	Excavation of switchyard and placement of material in embankment				
3.3.9	Excavation of material in front of tunnel's stilling basin and placement in embankment				
4	**Powerhouse I**				
4.1	Construction of powerhouse (civil works)				
4.2	Installation of penstock trifurcation				
4.3	Installation, testing and commissioning of electromechanical equipment				
4.4	Transmission lines				
5	**Powerhouse II**				
5.1	Excavation and preparation of weir foundation				
5.2	Construction of weir and drainage systems				
5.3	Construction of undersluices				
5.4	Construction of tunnel				
5.5	Construction of forebay				
5.6	Construction of powerhouse (civil works)				
5.7	Installation of penstock				
5.8	Installation, testing and commissioning of electromechanical equipment				
5.9	Transmission lines				
5.10	Construction of embankment				
6	**Powerhouse III**				
6.1	Excavation and preparation of weir foundation				
6.2	Construction of weir and drainage systems				
6.3	Construction of tunnel				
6.4	Construction of surge chamber				
6.5	Construction of powerhouse (civil works)				
6.6	Installation of penstock				
6.7	Installation, testing and commissioning of electromechanical equipment				
6.8	Transmission lines				

There will be some road improvements include construction of a new access road for Powerhouse II on the right bank of the river. It involves rock cutting but does not involve any bridges. Its length will be 5 miles and its width 30 ft. A new access road for Powerhouse III will also be needed. The road involves construction of a bridge. The road will be constructed on the right bank of the river for access to the intake tunnel and powerhouse. The total length will be 2 miles. The existing road from the dam site to Powerhouse III, on the left bank of the river, will be improved. It is about 10 miles long. Upgrades will include construction of one bridge, 12 culverts, and 12 causeways.

Construction Camps: It is anticipated that about 200 engineers, geologists and other professionals will be working for the construction supervision of the project. Due to the short duration of the project and its isolated location, it was considered uneconomical to provide residential accommodation at site with all amenities available at Bannu; therefore only two colonies with residential and office accommodation have been proposed; one at a site in the Spaira Ragha Plain with reasonable amenities and the other at Bannu with all amenities available in the city. The colony proposed in the Spaira Ragha Plain is at a convenient distance of 8 km from the dam site.

A camp will also be needed for the contractor's personnel. The camp will be constructed by the contractor to his requirements and it is anticipated that the labor force will be about 1,100 persons

at peak, for which appropriate provisions shall be made. Provision for construction of works shall include a medical dispensary, water supply and sewerage system, access roads, electricity and illumination, shops, hard furnishing of offices and accommodations. Land shall be leased or acquired, as appropriate, for camp construction.

Operation Phase**:** The Kurram Tangi Reservoir will be operated to provide water to the downstream irrigation canals. Reservoir operation was simulated for planned irrigation target releases using historical/simulated river flow values, gross storage of 1,200,000 AF, and dead storage of 300,000 AF. Over the study period (1971-2001) analyzed in prior studies, seven years would have water shortages, with an average shortage during shortage years of 10,900 AF/year, and an average over all shortage of 2,500 AF/year.

The flows of the Kurram and Kaitu Rivers are stored in varying amounts at multiple sites: Kurram Tangi Dam, Weir III Reservoir, Kurram Garhi Head Works, and Baran Dam. Water is to be released to different canals to ensure that planned crop water requirements are met for the Civil Canals, Marwat Canal and the proposed Thal canal.

2.1.3 Component 3: Irrigation Development

Component Three includes the new Thal Canal and rehabilitation and upgrade of the existing Civil and Marwat Canals to improve the water conveyance performance of the present systems. The tertiary canals and the development of Command areas for the Thal canals will be done by the Irrigation Department. Transmission and distribution (rural electrification) will be done by other entities operating in the project area.

Thal Canal: The existing Kurram Garhi Headworks, constructed during 1959-1969, regulates flow to the existing Civil Canals. A new head regulator will be constructed at the Kurram Garhi Headworks to service the new Thal Canal. The head regulator will have one bay with vertical lift gate and off-take from the left bank of Kurram Garhi Headworks and lead to a tunnel. A tunnel will run underneath the hill range for 3,100 ft before it transitions back into a trapezoidal channel. The canal takes its course through undulating hills, crosses various streams and ends in the Karak District.

Rehabilitation and Upgrade of the Civil and Marwat Canals: The project will also upgrade about 200 miles of old canals, collectively called Civil Canals, built by landowners, with a command area of approximately 107,000 acres, and the Marwat Canal, with a command area of 170,000 acres. The Civil Canals have been the means of irrigation in Bannu area for a long time. These channels were originally laid down, probably sometime in the first half of the 20th century, by the landowners and promoted by the local community. As such, these channels were constructed with an indigenous design approach and gradually expanded the irrigation to a large area over the decades. With the construction of Kurram Garhi Headworks in 1959 to regulate the Kurram River flows, these canals were given a sound base for further development. However, the Kuram Garhi Headworks lack seasonal regulation capability. Due to the fluctuations in river flow, realizing a sustainable agriculture has been hard. In 1962 Baran Dam and Marwat Canal system were added. Usefulness of the Baran Dam was badly affected by silting up of the reservoir within a relatively short span of 30-years with loss of 70% of its capacity. The existing Civil Canals have neither proper alignments nor bed grades. The canals flow generally along the course of depressions and nullahs. Present cross sections of the canals cannot cope with the discharges being conveyed and as such, there are overflows of the canals, as there is no freeboard.

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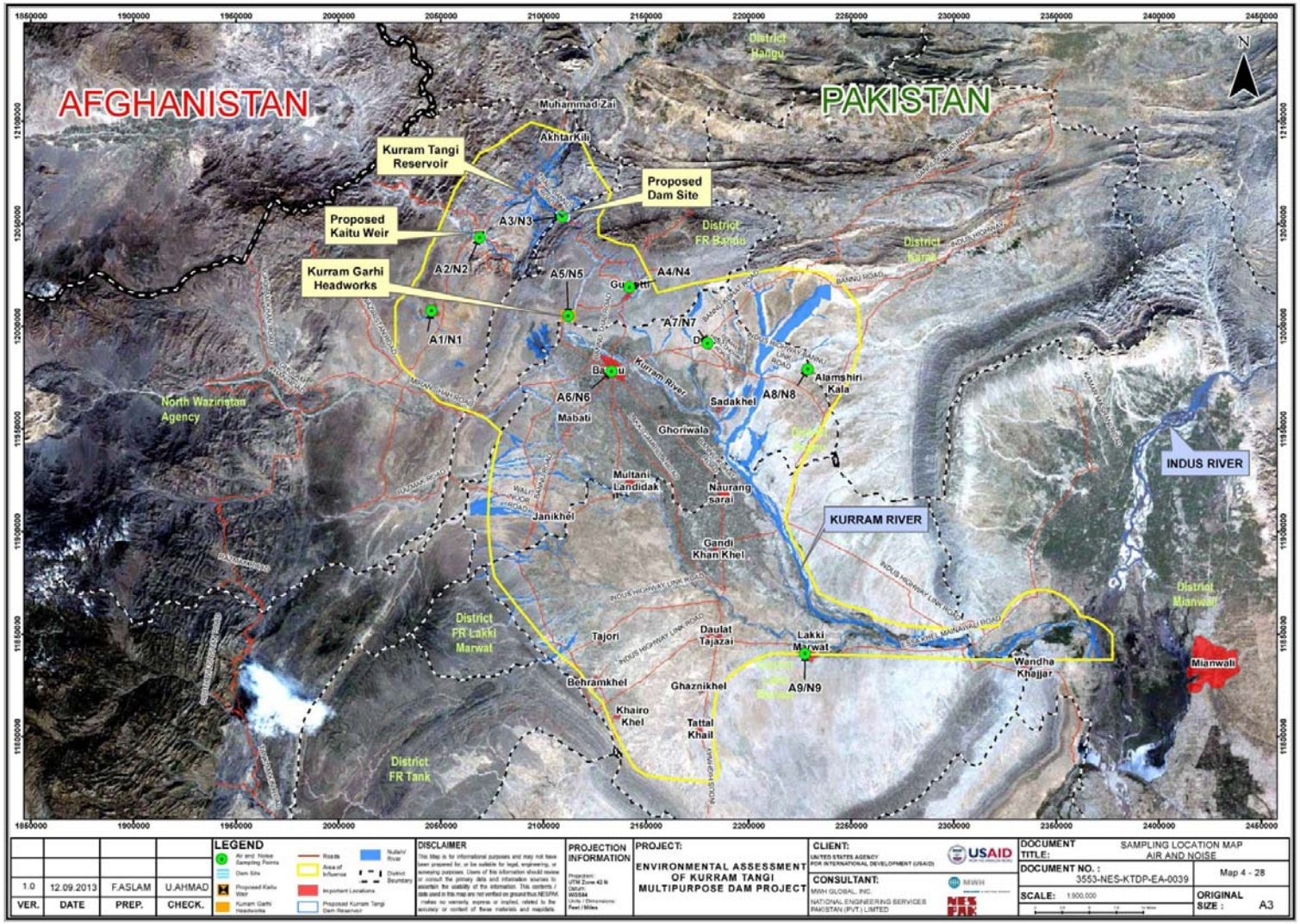

				LEGEND	DISCLAIMER	PROJECTION INFORMATION	PROJECT:	CLIENT:	DOCUMENT TITLE:	SAMPLING LOCATION MAP AIR AND NOISE
				Air and Noise Sampling Points; Dam Site; Proposed Kaitu Weir; Kurram Garhi Headworks; Roads; Area of Influence; Important Locations; Proposed Kurram Tangi Dam Reservoir; Nullah/ River; District Boundary	This Map is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. This contents / data used in this map are not verified on ground thus NESPAK makes no warranty, express or implied, related to the accuracy or content of these materials and mapdata.	Projection: UTM Zone 42 N; Datum: WGS84; Units / Dimensions: Feet / Miles	ENVIRONMENTAL ASSESSMENT OF KURRAM TANGI MULTIPURPOSE DAM PROJECT	UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID); USAID	DOCUMENT NO. : 3553-NES-KTDP-EA-0039	Map 4 - 28
1.0	12.09.2013	F.ASLAM	U.AHMAD					CONSULTANT: MWH GLOBAL, INC. NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED	SCALE: 1:900,000	ORIGINAL SIZE : A3
VER.	DATE	PREP.	CHECK.							

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Except at the main feeder and canal heads, there are no regulators on any distributary or minor. The outlets have no controlling structure but function freely at user's discretion. The channels run with disproportional withdrawal resulting in inequitable distribution. Over-withdrawal in upper reaches of the canal results in colossal wastage of irrigation water which gives rise to water-logging and salinity conditions and also results in acute shortages of water in the lower reaches, thus reducing the intensity and crop yields

The upgrade of the Marwat and Civil canals, along with the construction of the Kurram Tangi Dam for the seasonal regulation of the Kurram River flows (see Component 2) has been identified as a solution for the development of a sustainable agriculture in the region. The canals will have differing sizes at various segments but will have a trapezoidal shape and will have a concrete lining throughout. The construction, or upgrade, of the primary and secondary canals will be done by WAPDA while the tertiary canals will be constructed by the Irrigation Department.

Construction Phase and Schedule

Figure 2-4: Construction Schedule for Component 3

Item No.	Activities	Period of Construction											
		Year 1				Year 2				Year 3			
1	**Construction and Housing Camps**												
2	**Roads, Bridges and Culverts**												
3	**Construction of Thal Canal**												
3.1	Construction of head regulator at Kurram Garhi headworks												
3.2	Construction of primary canal												
3.3	Construction of secondary canals												
4	**Upgrade/Remodeling of Existing Canals**												
4.1	Marwat canals												
4.2	Civil canals												
5	**Development of Command Areas and WUAs**												
5.1	Development of Thal Command Area												
5,2	Upgrade of Marwat and Civil Command Area												

Operation Phase**:** No information is yet available on the operation of the new Thal canals and the organization of Command Areas and potentially the creation of Water Users Associations.

2.2 Land and Resource Needs of KTDP

As detailed in Table 2-1 the overall footprint of the project is presently estimated to be 182,000 acres of which more than 90 percent are earmarked for the development of command areas. 65 percent of this land is presently used for agricultural purposes, 16 percent is undeveloped land (Worsho), 14 percent is water, riverbed and 5 percent is used as residential land. In addition quite some land will need to be acquired to provide ground, rocks and gravel to fill the dams as well as limestone for cement. As the detailed location of the quarries that will provide the required resources (see Table 2-1) is presently unknown, the associated land acquisition will need to be covered in more detail in the RAPs.

Table 2-1: Land acquisition need for KTDP

Package	Affected land and land use (acres)				
	Total	Agric	residential	Water	Worsho
Kaitu weir with other permanent facilities	3.5	0.0	0.0	3.2	0.3
Kaitu reservoir	45.2	16.5	0.0	27.2	1.6
Kaitu weir construction camp, quarry . (temporary facility)	10.0	2.0	0.0	0.0	8.0
Subtotal Kaitu Weir, reservoir, camps, quarries .	58.7	18.5	0.0	30.3	9.9
Mains and secondary canals of the Spaira Ragha CA	78.7	33.6	0.1	0.5	44.4
Mains and secondary canals of the Sheratalla CA	319.2	79.5	2.5	8.3	229.0
New 12 mile road from Spinwam to Spaira Ragha	129.0	12.9	1.2	2.7	112.1
Access road to power house 4	1.1	0.5	0.0	0.0	0.5
Access road to power house 5	2.3	0.0	0.0	0.0	2.3
Powerhouse 4 at the Kurram + Transfer canal and tunnel	24.0	0.0	0.0	0.5	23.3
Pumphouse for lift canal, housing, support/security staff	0.6	0.0	0.0	0.0	0.6
Powerhouse 5	0.1	0.0	0.0	0.0	0.1

Table 2-1: Land acquisition need for KTDP

Package	Affected land and land use (acres)				
	Total	Agric	residential	Water	Worsho
Canals, roads, powerhouses, tunnel etc.	554.9	126.5	3.8	12.0	412.4
Transmission lines from Power House 4 to Domain Substation	302.4	67.8	3.3	28.0	203.3
Transmission line from Kaitu Weir to pump house	4.8	0.5	0.2	0.0	4.1
Transmission lines from Powerhouse 5 to Weir	28.4	5.7	0.0	0.0	22.7
Transmission lines	335.6	74.0	3.6	28.0	230.1
Overall area of Spaira Ragha Command Area	4,302	2,668	4	42	1,588
Overall area of the Sheratalla Command Area	18,427	5,983	309	573	11,561
Command Areas	22,729	8,651	313	616	13,149
Component 1 Total	**23,679**	**8,870**	**320**	**686**	**13,802**
Kurram Tangi Dam and Reservoir	1,589.0	326.1	1,499.8	8,028.6	1,589.0
Kurram Tangi construction & security camps	2.6	0.0	0.0	7.5	2.6
Powerhouse 1, weir and appurtenant structure	0.1	0.0	1.0	7.2	0.1
Powerhouse 2, weir and appurtenant structure	2.1	0.0	1.5	8.0	2.1
New access road to power house 2 and 3	1.1	0.0	0.0	55.0	1.1
Powerhouse 3, weir and appurtenant structure	0.0	0.0	3.8	3.8	0.0
New alignment of Mirali-Spinwam-Thal road	0.0	2.5	1.9	56.0	0.0
Additional land take for enhancement of Bannu-Shewa road	4.0	2.0	0.0	10.0	4.0
Resettlement sites	483.3	161.1	0.0	1,933.2	483.3
Component 2 Total	**2,082**	**492**	**1,508**	**10,109**	**2,082**
Canals to Thal Command Area	589.4	23.8	85.5	180.7	589.4
Thal Command Area	107,276	7,600	22,910	6,017	107,276
Component 3 Total	**107,866**	**7,624**	**22,996**	**6,198**	**107,866**
Grand Total	**118,818**	**8,436**	**25,190**	**30,109**	**118,818**

Table 2-2: Resource required for the construction of KTDP

Resources	Component 1	Component 2	Component 3	Total
Excavation	53 million ft^3	250 million ft^3	125 million ft^3	428 million ft^3
Filling	176 million ft^3	4.5 million ft^3	160 million ft^3	340 million ft^3
Concrete	6.5 million ft^3	20 million ft^3	17 million ft^3	33.5 million ft^3
Steel Reinforcement	7.3 million lbs	44 million lbs	36 million lbs	87 million lbs
Cement	900,000 bags	4 million bags	4 million bags	4 million bags

Plate 2-2: Kaitu pool area (Component One) Plate 2-3: Component Two area

2.3 Scope of the Cultural Heritage Preservaion Plan

The objectives of this CHPP are:

- To identify all cultural heritage potentially affected by the KTDP;
- To evaluate their significance;
- To avoid adverse impacts on significant cultural heritage resources where feasible;
- To minimize and/or mitigating any unavoidable impacts on high value cultural heritage in line with national and international legislation;
- To establish procedures to excavate all valuable cultural heritage sites that will be destroyed; and,
- To build on existing institutional capabilities a comprehensive management and monitoring plan to assure compliance with these objectives.

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3 CULTURAL HERITAGE BASELINE INFORMATION

3.1 Information Sources and Methodology

The Cultural Heritage Baseline was compiled from a desktop study that included:

- A literature review;
- Analysis of satellite images (aerial archaeology); and,
- Consultations with experts, representatives of competent authorities etc.

Normally a CHPP includes identification studies (systematic foot surveys including shovel test pits at sites of potential significance) and evaluations of identified cultural heritage sites. Unfortunately, these could not be performed at this stage for the following reasons:

- Component One and Two: Due to the security situation in North Waziristan the FATA Secretariat advised to not conduct any work outside the settlements. To overcome this limitation, village meetings (*Jirgas*) were held to obtain local information on: a) known cultural heritage sites in particular graveyards and other living cultural sites; b) preferences how to deal with these sites; c) indications were remains have appeared during construction work or plowing and which could be unknown cultural heritage sites. Unfortunately, the feedback from these village meetings was rather limited. It is assumed that this is partly related to the fact that no experienced archaeologist could be deployed to the region[2] as well as the general low level of trust the local populations have towards surveys in particular if the relevance to their daily line and needs is not easily visible.
- Component Three: The impacts on cultural heritage sites will largely come from the construction of transfer, main, secondary and tertiary canals, but the available engineering is not yet very detailed and detailed design not yet commissioned. Therefore, the detailed location of the canals is not yet known and/or may change quite significantly during detailed design. It seems therefore premature to conduct a foot survey along canals that exist on paper, but which have not yet been surveyed in detail by the engineering team from WAPDA and the Department of Irrigation.

3.1.1 Desktop study

3.1.1.1 Literature Review

The objective of the desktop study was to identify known cultural heritage sites as well as Areas of High Archaeological Potential (AHAP). The identification of known cultural heritage sites drew on substantial information from three published sources:

- In particular the works of Sir Aurel Stein, who conducted the first archaeological surveys in the study area in 1904 and 1927 is very relevant.
- Further, some important and successful excavations have been conducted by Prof Hassan Dani in North Waziristan in the 1960s.
- Finally, the Bannu Archaeological Project (http://www.arch.cam.ac.uk/bannu-archaeological-project/) that involved scholars from the Pakistan Heritage Society, University College London, The British Museum, Bryn Mawr College and the University of Cambridge (between 1985 and 2001) produced a wealth of information on the Bannu Plain including the area of Component 3.

3.1.1.2 Analysis of Satellite Images

Arial Archaeology, which is a well-established discipline (see for example Bourgeois & Meganck 2005), can predict quite well which areas are likely to contain historical remains. It was therefore used in addition to the literature review to identify AHAP in high resolution satellite images based

[2] This had two reasons: a) no archaeologist from the tribal areas in Component One and Two could be located and b) no other people incl. a Pashto speaking archaeologists were allowed to visit the region for security concerns.

on a variety of factors, including a) the existence of known cultural heritage sites nearby, b) typical ancient settlement patterns, c) the level of ground disturbance, and d) geographical features which will have made an area attractive to human inhabitants, such as topography, the presence of flat, arable land, water sources, and other natural resources.

3.1.1.3 Expert Consultations

Expert consultations helped clarify information found in published sources, update research results, identify on-going and/or unpublished research, provide information on additional sources, experts and key informants and e) test key assumptions and management options. The following experts were consulted:

- Prof Farid Khan (former head of Bannu Archaeology Project);
- Prof Kenneth Thomas (former member of Bannu Archaeology Project);

as well as the following relevant agencies:

- Department of Archaeology & Museums, Government of Pakistan (Islamabad);
- Institute of Archaeology and Social Anthropology, University of Peshawar;
- Peshawar Museum; and,
- Bannu University

3.2 Cultural Heritage Baseline Information

Pakistan is an ancient land in world history. The oldest remains of human activity were found in the Soan Valley (Panjab). For Mehrgarh (Baluchistan), continuous human presence could be documented for the period from 8,000 to 2,500 BCE. Somewhere around 2,700-2,500 BCE, this and other settlements began to disintegrate, possibly as a result of migration by people towards the Indus Basin. This process coincided with the emergence and extension of settled or urban life in the greater Indus Valley, culminating around 2,300-1,500 BCE, in the Bronze Age "Indus Valley Civilization" represented by the sites of Moenjodaro (Sindh) and Harappa (Punjab), which are considered as the most developed early urban civilizations.

It is believed that the fall of the Indus Civilization was caused by Aryan tribes about 1,500 BCE. They were pastoral societies which developed into the Rig-Vedic States. Over the years, the territories now constituting Northern Pakistan were conquered by the armies of Darius I of Persia, the Mauryan Great King Asoka, Bactrian Greeks, Scythians, Parthians and Kushans. One of the most prized art forms of Pakistan "the Buddhist Art of Gandhara" reached its zenith during the reign of Kanishka (120-150 CE).

After the conquest of Sindh under General Muhammad Bin Qasim in 711 CE, Islam gained firm hold of the area. From 1,000 CE onwards, the Muslim dynasties of Ghaznavis, Ghoris, Khiljis and Tughlaks ruled over the subcontinent until the invasion of Timour, who paved the way for the great Mughal Empire that dominated the subcontinent until its fall in 1857.

These regional historical developments also determined to a large extent the history of the Bannu plains and the associated lower Kurram and Kaitu valleys. Research suggests that the history of the human occupation of the Bannu plain began as early as the Upper Palaeolithic Period (30,000-40,000 BCE; Khan, Knox & Thomas 1991). This was a period characterized by the use of large, well-made flake tools found extensively in the north-west of the Bannu plain and the lower Kurram valley. About ten thousand years ago, a Mesolithic culture, probably a hunter-gather economy, was occupying the sandy areas of the Takhti Khel and left large numbers of stone tools behind.

Table 3-1: Cultural Sequence and Chronology of late Prehistoric sites in the Bannu Area

Cultural Phase	Type Site	Bannu SItes	Date Ranges (cal BC)
Early Harappan (Early Bronze Age)	Kot Diji (Sindh Province)	Islam Chowki Taralai Qila Tarakai Ghundai Lewan Seer Dheri	2500-2400 None available Ditto Ditto Ditto
Pre-Harappan (Chalcolithic to Early Bronze Age)	Rehman Dheri (RHD phase 1)	Islam Chowki Lak Largai Ter Kala DHeri Lewan	2750-2550 2885-2625 2920-2625 None available
Late Neolithic to Early Chalcolithic	Sheri Khan Tarakai	Ter Kala Dheri Sheri Khan Tarakai Barrai Khuarra i Girdai	3110-2880 4240-2915 None available Ditto

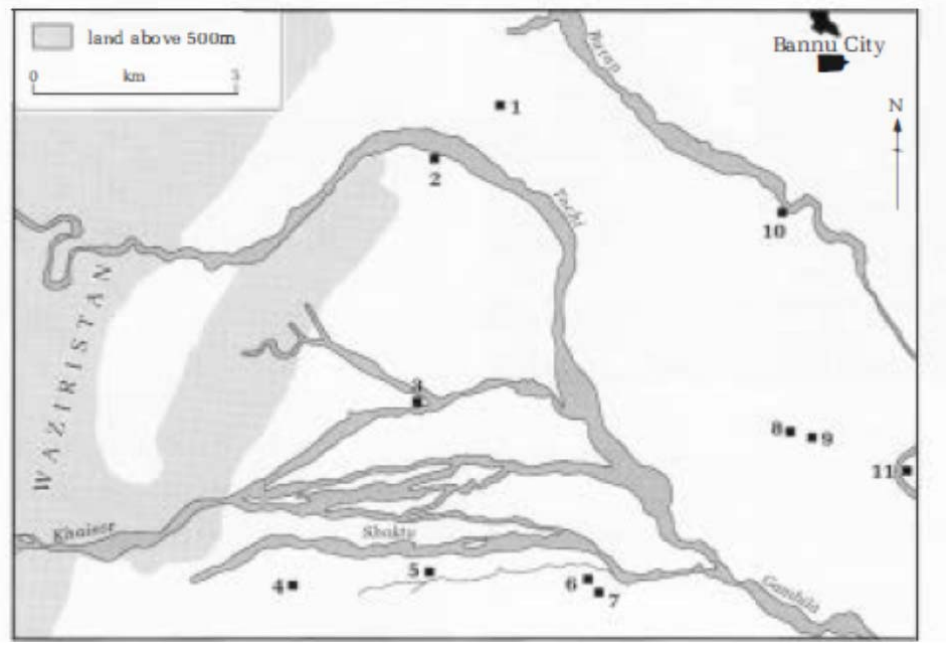
(Thomas 1994 :41)

By about the middle of the fifth millennium BCE a pre-metal, pottery-using culture had been settled around Bannu and engaged in the growing of domesticated food grains, keeping cattle, goats, and sheep, engaged in trade of various commodities over long distances and living in permanent villages containing rectangular houses of mud brick and mud slab construction. A complex ideology seems to have been one of the most important characteristics of this period and terracotta figurines in stylized human female shapes had been found extensively in Sheri Khan Tarakai in the Jani Khel Area some twenty miles south-west of Bannu, Barrai Khuarra I, a small scatter of pottery near Lak Largai, Girdai, a large but badly damaged site on the right bank of the Tochi near the road from Bannu to the Jani Khel and at Ter Kala Dheri on the Lohra Nullah (Khan et al 2010).

The successors of this Neolithic, village-based, agricultural system were two Bronze Age periods with distinctive ceramic assemblages of which remains have been found at Lewan (Allchin et al. 1986) and Lak Largai (Khan, Knox & Thomas 1991:24-31). Traces of this period are also found at Ter Kala Dheri on the Lohra Nullah. The Kot Dijian "culture" which dates from about BCE 2600 to the end of the third millennium BCE is well represented at a number of sites in the Bannu region including Tarakai Qila (Allchin and Knox 1981:245-250), Islam Chowki (Khan, Knox, Thomas 1991:7-18) and Tarakai Ghundai (Khan, Knox and Thomas 1991:31-34). These sites are all relatively small villages, clearly agricultural in basic economy but with major trading relationships spreading across what is likely to have been a vast area.

Interestingly no material associated with the Indus Civilization and the Gandhara Grave Culture has yet been found in the Bannu region, but at Akra and Ter Kala Dheri, both on the Lohra Nullah, extensive deposits of black-painted red pottery were found along with iron artifacts and a series of floor levels, pits, hearths and other domestic debris including an impressive curving stone wall made of layers of large river cobbles all above a lower, earlier wall made of carefully placed yellow mud lumps cemented together with a darker mud mortar.

Figure 3-1: The Northwest Bannu Basin



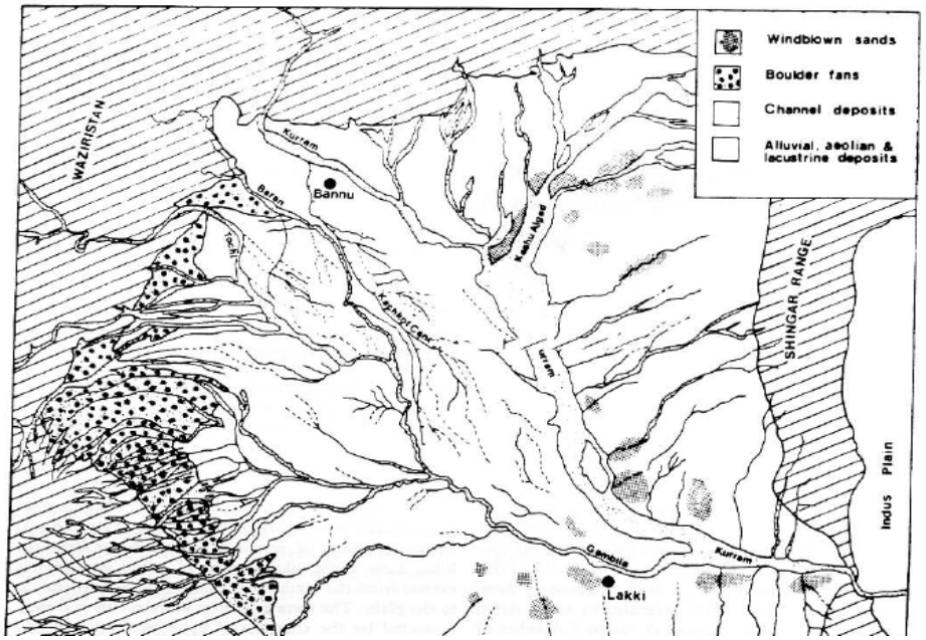
Thomas 1994 :40

Research suggests that the Achaemenides reached the area of todays' North West Pakistan by the 6th – 5th centuries BCE and it seems clear that their province Sattagydia is actually Bannu/Waziristan (Caroe 1958: 38). The capital to this region, Akra, was said to be "a great city, the seat of government of this territory and the place of residence of Rustam, the son of ZaliZar … [who] … held the territories of Zabul and Kabul" (quoted in Raverty 1883: 317-8). This places Akra in the same category of important local administrative/commercial capitals as Kandahar, Sirkap at Taxila (Panjab) and Bala Hisar near Charsada (Khyber Pakhtunkhwa). This suggests that the Kurram was in early historic times a trade route from the west to the Indus valley and brought this area into close contact with the ancient Persians.

The earliest coin found in the Bannu plain was issued before the arrival of Alexander the Great and connects the Bannu region with the Achaemenid provincial centers in northern Pakistan and Afghanistan where coins of this type were made. The second oldest coin had been issued by the Mauryan Empire i.e. 300-180 BCE. Many more coins can be associated with the Greek period, which had put an end to Mauryan rule during the second century BCE and have been found all over the Bannu plains. Similarly a good number of coins were discovered in the Bannu plain from the Indo-Scythians (80 BCE - 50 CE), which captured the Greek kingdom, the Indo-Parthian that succeeded them (20-80 CE) as well as from the Kushan period 10-360 CE, including coins from their contemporaries, the Kushano -Sasanian rulers in Afghanistan and northern Pakistan (230-370 CE) underlining once more the importance of the Kurram trade route.

In the 9th century the Muslim presence in Afghanistan changed the political landscape and around the time when Kabul was taken in 870 CE by the army of Yakub bin Laith al Saffar, the Hindu rulers of the Bannu plains commissioned the construction of the fortresses of Kafir Kot North and Bilot (Kafir Kot South) (Stein 1905: 10-17) as well as similar pre-Muslim fortresses in the Kohat District (Stein 1905:2-4). In this historical context one can also place Stein's discovery of a "ruined stupa" at Ark Ghundai on the Tochi River near Idak "about 27 miles from Bannu and about 6 miles beyond Khajur". Unfortunately, no archaeologist seems to have visited the site since Stein trip in 1924.

Figure 3-2: Cultural Heritage Sites in the Bannu Basin



Khan, Knox and Thomas 1987: 84.

Though Hinduism was probably the most important religion practiced in the Bannu region in pre-Muslim times, no ancient Hindu temples have survived on the Bannu plain itself beside of a small brick structure found in the Kakki village cemetery, a badly damaged potential temple foundation near the Kot Dijian site on the road to Dar Dariz near Bannu and number of Hindu sculptures near the village Wanda Shehab Khel (Khan 1992: 67-72; 1993: 87-91).

Figure 3-3: Inscription from Year 39 CE

Research suggests that the Kothal Pass which connects the Peshawar/Gandhara area with the Kohat/Bannu region marks an ancient cultural and religious boundary and a frontier between the Buddhist north and an overwhelmingly Hindu southern region. South of the Kothal Pass the Yusufzai Pushto language of Gandhara begins gradually to give way to the southern versions of the language spoken in Bannu and Waziristan and adjacent areas. Possibly related to this division is the dearth of Buddhist material from the Bannu region. In this perspective the Kurram valley might contain important relicts of the collaboration or conflicts between these two cultures/religions.

Three "Tochi inscriptions", which are on display in the Peshawar Museum, were found between Idak and Spinwam. These stones display a combination of Arabic, Sanskrit and Bactrian texts and have been dated to the mid-9th century CE. This combination of texts can also be observed in findings from Malik Azdar near Mir Ali, on the way from Spinwam to Raznak south of the Tochi River and Khojala Baba, near Kruman Garhi where the Kurram breaks through the hills.

While the existing archaeology provides sufficient evidence to establish the history of the Bannu plain and gives some hints on the importance of the Kurram trade route, with the exception of Sir Aurel Stein in the early 19th century no systematic research of the Kurram valley has been conducted. Consequently nothing had been found apart from those findings made by Hassan Dani in the 1960ties during his survey of the Shertalla Plains and Spinwam (Dani 1964, 1968). Therefore, it seems well justified to have a closer look at Stein's archaeological surveys on the Kurram and Kaitu valley in 1904 and 1927:

Following up on rapid inventories of known side conducted by Sir Alexander Cunningham in the context of the Archaeological Survey of India (1861 ff.) Stein became interested in the region as he believed that the Kurram is actually the river "Krumu" mentioned in the Rigveda and the Kurram valley the "spiti-gaona gairi" in the Yasna (Stein 1905). He further associated the Kurram valley as the route the Chinese pilgrim Fa-Xian (ca. 400 AD) used to travel from Kabul to Po-na, which Stein associates with Bannu. Also Hiuan Tsang (ca. 650 AD) seems to have travelled along the Kurram from Kabul to Bannu and mentioned the area to be densely populated. Hiuen Tsang suggested further that the lower Kurram valley as well as the Bannu plains were ruled from Akra, while the mountain regions were "wholly independent of the rule established in Bannu" and inhabited by "separate clans without any chief ruler" (Stein 1905:6).

Stein suggested that based on his own research and reports he received from the various British officials in the region "the known antiquarian remains … are scanty" (Stein 1905:6). "Whatever remains of antiquity the Kurram Valley may still retain below the ground or in the little known glens of the Sahed-Koh, it appears to me highly probable that the route which leads through it must, owing to the great national facilities it offers for communication between Kabul and the central part of the Indus Valley, have been one of considerable commercial and political importance in ancient times" (Stein 1905:7).

In January 1927, Stein had another chance to visit the area and walked from Miranshah to Spinwam and from there along the Kaitu and Kurram to Bannu. About 1 mile north of Spinwam he did a quick survey of a "conspicuous mound" that contained some pottery. On January 18, 1927 he walked down the Kaitu and Kurram valley and discovered 8 miles north of Bannu (0.5 miles north of Shahidan, which itself has a large burial ground) on the eastern side of the Kurram an interesting site with the name of Kane-wor, but didn't have time to excavate it (Stein 1929:18). On the western side of the river just above the today's Kurram-Garhi dam he discovered further an important site that is known to the local populations as Padshah-Kotkai (king's castle), which Stein considered together with several nearby mounds and the remains wall of around 0.5 miles length as an extensive and important site (Stein 1929:19).

The only known follow up seems to be two identification surveys conducted by the late Ahmed Dani (founder of the archaeological department at the University of Peshawar): In 1962 he discovered in the Shertala Plains two trilingual inscriptions (see above, Dani 1964) and in 1966 he discovered along the Keitu near Spinwam (Dani 1968:255) and a site called Khazana Dheri (4 miles from Mir Ali on the Idak Spinwam road) (Dani 1968:49) two huge mound with coins of the Greeks, Seythians and Kushans period.

4 THE PRESERVATION AND PROTECTION OF CULTURAL HERITAGE

4.1 National Cultural Heritage Legislation

Pakistan has a comprehensive legislation on antiquities and how to deal with physical cultural heritage sites (maintenance, protection, permitting etc.).

The cultural heritage legislations most relevant for the KTDP are the following:

Antiquities Act 1975 (Act No 7 of 1976, as amended in 1992) replaces the Ancient Monuments Preservation Act of 1904 as amended in 1950 (Act 84) and 1968 (Act 16). The act focuses on the preservation and protection of antiquities and "extends to the whole of Pakistan" (§1.3) and therefore applies for the project area including North Waziristan. It specifies that, in Pakistan, everything established before 1900 is considered "ancient" and that it applies to a wide area covering "historical, ethnographical, anthropological, military and scientific interests (§2.c.iii). In case any movable antiquity (coins etc.) is found, the project needs to inform the Director General of the Department of Archaeology and Museums within seven days and ask for his guidance on what to do and who takes over the ownership of any newly discovered antiquity (§13). If these provisions are not followed, the person who made the discovery and failed to inform the authorities can be imprisoned for up to three years (§5.a.1-4).

The Director General can conduct archaeological surveys on all private and public land (§6), can expropriate all lands that might contain any antiquity under the Land Acquisition Act of 1894 (§7) and place any antiquity including the land around it under protection (§10). In case it is a "protected immovable antiquity in danger of being destroyed, injured or fall into decay" the Provincial government shall expropriate the immovable antiquity including all land on which the antiquity is based, with the exception of religious sites and/or any antiquity that is managed by a custodian under the supervision of the Director General (§15). No protected antiquity shall without the approval of the Director General being destroyed, broken, damaged, altered, injured etc. (§19) and no development scheme shall be implemented in a buffer zone of 200 feet around a protected immovable antiquity (§22). This includes also quarrying, excavating, blasting and other operations of a likely nature including the movement of heavy vehicles i.e. most of the activities to be expected during construction (§28). Any misconduct can result in imprisonment of up to 3 years (§19.2). The act also rules that no excavation or exploration shall be conducted without a license and the consent of the owner of the land (§29).

It also includes a list of all immovable antiquities under protection in the Bannu District: a) Akra (mounds at Akra near the village Bhart, b) Seri Khan Tarakai in the village Jani Khel Wazir, and c) Ghundai near the village Bakka Khel Wazir.

Immovable Antiquities (Mining, quarrying and blasting in restricted areas) rules 1979 (Notification SRO No 791 of 29th August 1979). These rules further elaborate the provision of §28 of the Antiquities Act (see above) and requests the government to notify the public about any plans to protect any immovable antiquity in an area used for mining, quarrying, blasting etc. 90 days before the final decision and consider in this the objections/suggestions made. It also provides for a process to conduct such work near immovable antiquities under the supervision of the Director General of Antiquities and Museums, if such work is amply justified.

Archaeological Excavation and Exploration Rules 1978 (Notification SRO No 1378 of 29th October 1989). These rules outline the process that need to be followed for any archaeological work. Simply speaking one needs a license from the Director General of Archaeology and Museums for any archaeological fieldwork. Such license should be granted when a) the team consists of at least two qualified experts, b) is associated with a reputable institution, c) can provide proof of a successful excavation or exploration in line with norms and licenses, d) has obtained access to the land, and e) is willing to train at least one nominee of the department of archaeology. All excavations/explorations shall be carried out under the general supervision of the Director General i.e. under the supervision of his representatives, all discoveries inspected by him and no finds destroyed, dismantled, removed or disturbed without prior written permission. The license can be

cancelled at any time and the licensee needs to compensate the state "the value of any antiquity found in the land and lost or destroyed while in the custody of the licensee, his servant or agent" (§6.1.a). Similarly, "the decision whether to preserve the archaeological remains in site or to fill in the excavated land shall be made by the Director General" (§10) and all findings shall be handed over to the government as all newly found antiquities are the property of the state.

National Fund for Cultural Heritage 1994 (Act No 8 of 1994). This act created the National Fund for Cultural Heritage with the aim of preserving Pakistan's historical and cultural heritage through various means including financial and technical assistance (§4). The fund is financed from grants from the Federal Government, aid and assistance from local, national and international agencies and income from the management of antiquities (§5). The fund is managed by the Director General of the Department of Archaeology and Museums under a high level board of governors and could become an important partner for any rescue excavations.

Other relevant acts on cultural heritage are[3]:

- Treasure Trove Act 1878 (act No 6 of 1878 as modified in 1891) on the prohibition and restriction of import and export of antiquities);
- The Antiquities (export control) Act 1947 (Act 31 of 1947);
- Export of Antiquities Rules 1979 (Notification SRO 744 on 19th August 1979);
- Cinematographical filming of protected antiquities rules 1980 (Notification SRO 1037 on 4th October 1980);
- Admission of public into immovable antiquities rules 1982 (Notification SRO 1048 on 17th October 1982);
- Dealing in antiquities rules 1989 (Notification SRO 647 on 20th June 1989);
- acquisition of antiquities rules 1989 (Notification SRO 943 on 16th September 1989);
- Customs act 1969 (Act No 4 of 1969 as modified in 1994) on the prohibition and restriction of import and export of antiquities (§15-18); and,
- Prohibition for movement of antiquities between specified areas (Notification SRO 1205 on 21st December 1993).

4.2 International Conventions and Agreements on Cultural Heritage

International conventions generally set out the obligations of national governments that have signed the convention. While it is accepted that specific projects have an important role to play in the implementation of some of these conventions, their applicability to the operation of projects like KTDP presents more a duty to respect physical cultural resources than a strict legal requirement. For these reasons the approach has been to understand the underlying principles of the conventions, and, first and foremost, ensure that the project does not inhibit the state's fulfillment of its obligations. Where the project is able to directly or indirectly support the State in meeting its obligations, it will aspire to reinforce the actives of the State here in particular the Department for Archaeology and Museums.

Pakistan has ratified the following international cultural heritage conventions:

- Convention for the Protection of Cultural Property in the Event of Armed Conflict (1954). Pakistan is a party to the Hague Convention and the first protocol that came into force in 1954, but not yet of the second protocol, which provides for much stronger protection came into force in 2004.

[3] Some more detailed regional cultural heritage acts have been enacted for Karachi (Karachi building and town planning regulations Master Plan for the preservation of structures of special architectural or historical interest; Sidh Building Control Ordinance 1979), Punjab (The Punjab Special Premises Preservation Ordinance 1985; Punjab Act No 3 of 1985) and Sindh (The Sindh cultural heritage act 1994; Sindh Act No 12 of 1994), but no similar ordinance could be found for the project area.

- Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970).
- Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention 1972).
- Convention for the Safeguarding of the Intangible Cultural Heritage (2003). As Pakistan became a party to this convention in 2005, the government committed itself to safeguard "intangible cultural heritage" i.e. "the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artifacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity." "Intangible cultural heritage is manifested inter alia in the following domains: (a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage;(b) performing arts; (c) social practices, rituals and festive events; (d) knowledge and practices concerning nature and the universe and (e) traditional craftsmanship

UNESCO Recommendations

- Recommendation concerning the Preservation and Protection of Cultural Property Endangered by Public Works.
- Recommendation concerning the Protection, at National Level, of the Cultural and Natural Heritage.
- Recommendation concerning the Safeguarding of the Beauty and Character of Landscapes and Sites.
- Recommendation concerning the Safeguarding and Contemporary Role of Historic Areas.
- Recommendation for the Protection of Movable Cultural Property.
- Recommendation on International Principles Applicable to Archaeological Excavations.

4.3 International Best Practice

The World Bank's policy regarding cultural properties (OP 4.11) is to assist in the preservation of cultural heritage, and to seek to avoid their elimination. It relies on the careful design and implementation of projects and considers the Environmental and Social Impact Assessment as the vehicle to ensure that development does not result in unacceptable damage to cultural heritage. Additional general guidance is found in the World Bank Guidebook "Physical Cultural Resources Safeguard Policy" (World Bank 2009).

With a view on how to preserve cultural heritage, best practice is documented in the charters of the International Commission on Monuments and Sites (ICOMOS). While ICOMOS is a commission of experts and therefore their charters are non-binding, ICOMOS assembles leading professionals (for example the ICOMOS Pakistan Committee was initiated by Late Dr. Ahmed Nabi Khan, then Director General of the Department of Archaeology and Museums) and therefore their charters quite influential:

- Burra Charter for the Conservation of Places of Cultural Significance.
- International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter).
- The Florence Charter (Historic gardens and landscapes).
- Charter on the Conservation of Historic Towns and Urban Areas.
- Charter for the Protection and Management of The Archaeological Heritage.
- Charter for the Protection and Management of Under Water Cultural Heritage.
- International Charter on Cultural Tourism.
- Principles for the Preservation of Historic Timber Structures.
- Charter on the Built Vernacular Heritage.

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5 IMPACT ASSESSMENT

There is significant experience with what impacts dams, reservoirs, canals, roads, transmission lines and command areas have on cultural heritage. One point that warrants highlighting is that areas around dams and reservoirs have often proven to be, at a much earlier time, also conducive to early and sustained human settlements. Thus dam sites are often rich in paleontological and archaeological material as well as sites of a religious and cultural connotation. In general dams and reservoirs are found to have a) a large footprint of direct impacts that are unavoidable as there are limited chances to adjust the shape of a reservoir etc.), b) often underestimated footprint of indirect impacts related to the need to relocate people and infrastructure as well as often significant associated facilities (access roads etc.), and c) long term indirect impacts including downstream areas (reduced groundwater levels with impact on soil stability etc.) and upstream (higher water tables leading to erosion). With a view on the KTDP the following impacts are likely to occur:

Table 5-1: Impact Assessment

Activity of feature	Impact
Direct impacts during the construction phase	
Transformation of land at the dam and main site, access roads, penstock, transmission line corridors, work camps as well as canals and mains etc. in the command areas	+ A positive impact is that these ground works can lead to the discovery of unknown sites/artifacts - There may be direct destruction or damage of cultural resources especially if they are unknown and/or buried; - Increasing pressure on land can lead to further transformation of other lands leading in turn to damages and destruction of cultural resources
Construction of dam, mains, penstock and power stations	- There may be direct destruction or damage of cultural resources especially if they are unknown and/or buried; - The activities can be an intrusion in the landscape i.e. aesthetically sensitive areas
Construction of canals, mains and other groundwork in the command area as well as construction of transmission lines	- This can cause destruction or damage to cultural heritage sites and an intrusion in the landscape in the case of aesthetically sensitive areas
Excavation of dam and main site, borrow pits and civil work	- Excavation can cause direct damage or destruction of cultural heritage sites especially archaeological sites
Quarrying, spoil areas and waste dams	- Hillside scars and other landscape damages can have visual impacts as well as influence groundwater levels of the surrounding lands
Air and water pollution from construction work	- The pollutants can cause direct damage to cultural heritage sites including natural and movable artifacts in the vicinity of the construction site and the access roads
Vibrations, air and soil pollution by the use and movement of heavy equipment and vehicles	- This can cause direct damage to cultural heritage sites including natural and movable artifacts but in particular historical buildings etc. in the vicinity of the construction sites and the access roads
Soil compaction by heavy construction equipment	- Soil compaction can damage buried material especially archaeological sites
Use of explosives	- Resulting vibration can result in damage to buildings, buried materials and cause landslides in cliffs and escarpment which may expose, damage and destroy buried resources and features such as caves etc.
Waste disposal	- Indiscriminate damping of waste material from the construction site etc. may cover or damage cultural heritage sites
Deforestation along, or adjacent to, the reservoir	- Extensive deforestation modifies the landscape and water levels and can have negative impacts on cultural heritage sites and visual impacts
Accidents	- Construction accidents, especially involving heavy equipment can directly damage build cultural heritage resources along the access roads
Construction of canals, penstocks, quarries, access roads, work camps	- Barrier effect of the feature can reduce access to living-culture resources as well as to sites that generate income
Establishment of work camps	- The workforce might get unregulated access to cultural resources resulting in accidental damages, vandalism and looting of moveable artifacts
Uncontrolled residential development (boom towns etc.)	- Impacts on invisible cultural heritage sites such as archaeological findings
Direct impacts during the commissioning	
Inundation of reservoir	-Inundation results in coverage or destruction of inundated land including all known and unknown cultural heritage sites -Resulting changes in the landscape have negative visual heritage sites such as water falls, gorges etc. -The reservoir reduces access to living cultural resources such as mosques, shrines, grave yards etc. -Inundating can raise the water table, which can have negative impacts on sites in or on the shoreline and adjoining lands
Raising the level of upstream rivers, operation of mains and command areas	- Raising of water levels can lead to erosion and damage build cultural heritage sites and caves

Table 5-1: Impact Assessment

Activity of feature	Impact
Indirect Impacts during commissioning	
Resettlement	- There may be direct destruction or damage of cultural resources in resettlement replacement areas especially if they are unknown and/or buried; - The activities can be an intrusion in the landscape i.e. aesthetically sensitive areas
Direct impacts during operation	
Reservoir, mains and command area operations	- Reservoir shoreline erosion can undermine built cultural heritage sites and expose subsurface archaeological remains, leading to illegal digging and looting; - Salinization of floodplain lands can cause damage to archaeological sites and building foundations; - Changes in downstream river morphology resulting from changing flow patterns and volumes can lead to river bank erosion, new river courses, and resultant undermining, exposure and damage to cultural heritage sites; - Accelerated flows associated with reduced sediment load can lead to impacts at the estuary and subsequent, impacts on the shore line, damaging monuments and tombs; - Long term sedimentation of the reservoir will cover any in situ archaeological sites, potentially rendering them permanently inaccessible.
Indirect impact during operation	
Project roads providing easier access to cultural sites	- Improved but unregulated access to sites can lead to increased human access to cultural sites traffic, resulting in damage and deterioration of both natural and built sites and unacceptable exposure of sacred sites. It can also result in looting of movable artifacts (including breakage off sections of immovable monuments), and can lead to the desecration of religious sites. - Improved but regulated access to sites can lead to increased human traffic, resulting in positive impacts: tourism-related income-generating activities, and wider academic scholarship. - In the case of road upgrading or new construction, the increased traffic volume, or new alignment, may cut off ready access to sites, which may in turn result in inconvenience, loss of livelihood or danger for the local community, and ultimately in reduced maintenance and conservation of the cultural heritage sites concerned.
Land clearing, human activities and grazing around reservoir and mains	These activities cause soil erosion, which can lead to exposure of archaeological artifacts and to illegal digging and looting and damage to graves and archaeological resources;
Poor drainage for run-off from project road surfaces and build areas	This can cause erosion of the adjoining land, which can lead to exposure and damage of graves and archaeological sites
Uncontrolled migration into, or in the vicinity of, the project in particular the command areas	Induced development and uncontrolled migration can lead to human pressure on sites, in particular those not being identified to be subject to impact from the project

5.1 Impact Avoidance and Impact Mitigation Measures

The preferred way to address potential impacts on archaeological sites, monuments and other cultural heritage is to avoid them through advanced planning and/or project design changes. While avoidance can be accomplished rather easily for the canals, mains by moving the infrastructure to avoid sites in advance of construction or, in some cases, during construction where important remains are made as "late finds", such measures are not feasible, especially for major infrastructure at the dam sites such as the power houses, the head works and the reservoir area.

The preferred way to deal with unavoidable impacts on cultural heritage sites is to excavate and study important sites and features prior to their disturbance or destruction and/or to relocate artifacts to a safe relocation site. This has been done with some success in other hydropower projects in Pakistan, but requires significant upfront work as historical site cannot be moved overnight. While excavations are effective ways to avoid that the information incorporated in the affected archaeological site is lost and significant experience has been gained to shift even large artifacts to new locations, it needs mention that the only truly effective way of mitigating impacts to monuments is to avoid touching them in the first place.

As outlined, the purpose of this CHPP is to translate general commitments in line with national and international standards into continuing actions:

- Carry out site identification surveys and classification prior to the start of ground works;
- Avoid identified high value cultural heritage resources when feasible;
- Carry out rescue excavations of those valuable sites which cannot be avoided;
- Establish comprehensive late find procedures for those sites that have not been identified; and,
- Preserve high value living cultural heritage sites.

5.1.1 Identification Survey and Classification

Identification surveys and classification are normally conducted as part of the baseline study for the CHPP. However, in this case this was not possible (see chapter 2.2.3). Therefore, the identification survey and classification has been limited at the time of writing this report to desktop studies and interviews with experts and local populations. The main source of information was a detailed list of cultural heritage sites established for each district by the Department of Archaeology and Museums.

The following cultural heritage sites have been identified within Component One including a one mile buffer:

- The ancient settlement of Mut Khel is located 6 miles south west of Spinwam with 200 m of the planned Sheratalla canal.
- The ancient settlement of Kaka Ziarat is located 5 miles upstream from Spinwam. Kaka Ziarat will not be affected by the project, but it is likely that there are remains all along the Kaitu river between Kaka Ziarat and Spinwam including the area of the reservoir.
- It has been indicated that quite some remains have been found in the Spaira Ragha and Sheratalla Plains when the area had been used by Afghan refugees in the 1980ties. Nevertheless, due to the emergency situation and security concern no follow up work was conducted.

The following known cultural heritage sites have been identified within Component Two including a one mile buffer:

- The shrine of the Fakir of Shewa at Shewa. While rather recent (1960s) it extremely highly valued by the local populations. Present engineering suggest that it will be inundated by the reservoir of the Kurram Tangi Dam.
- The ruins of British army post at Shewa, which will be also inundated by the reservoir.
- The ancient settlement Dragai, which is located 2.5 miles downstream of Zarwam along the Kurram and might be affected by Powerhouse Two and Three and the associated canals.
- The ancient settlement China Ziarat, which is located 4 miles south east of Zarwam and might be an important site for the documentation of Buddhist influence to the region. China Ziarat is unlikely to be affected, but it can be assumed that there are associated structures along the Kurram that might be affected by Powerhouse Two and Three.
- The ancient military post Tarnao is located 5 miles downstream of Zarwam at the site of the Kurram. As it is built into the hill, the changed water levels might reduce the soil stability around Tarnao.

The following known cultural heritage sites have been identified within Component Three including a one mile buffer:

- The ancient military post Tor Mama Ziarat is located 1 mile upstream of the Barran lake and might be affected by the Thal embankment.
- The ancient settlement Palosai Kili, which is located 5 miles upstream of Bannu, might again be affected due to soil instability when significant parts of the Kurram are channeled into the Thal Canal.
- There are a large number of smaller sites within the future Thal Command Area (> 140,000 acres) but as no detailed design is available, it has limited value to list all these sites that might or might not be close to the secondary and tertiary canals.

To overcome this data shortage and to enhance this rather preliminary identification, KTDP will deploy experienced archaeologists to Component One and Two as soon as is considered safe to conduct ground surveys and to Component Three as soon as detailed engineering is available and at latest three months before the commencement of the construction work in the specific Subcomponent to conduct:

- Systematic foot surveys including shovel test pits at sites of potential significance of a) construction sites (dams, head regulators, access roads, new road alignment, camps, power station area, resettlement areas etc) b) reservoir area and c) canals and command area; and,
- In-depth discussions with key-informants in each settlement to follow and further specify the information outlined above.

The first survey will be conducted by a team that include a minimum of two qualified archaeologists that will record and report each cultural heritage site and classify them based on the instrument and matrix presented in Annex 2 of this report.

5.1.2 Rerouting Procedure for Canals and Linear Infrastructure.

In case the identification survey detects one or more potentially high value cultural heritage directly located in the corridor earmarked for the canals, mains etc. and/or less than 20 m away from either side of the these canals etc., KTDP will conduct an Evaluation (see 5.1.3.) performed by at least two qualified archaeologists to confirm/validate the exact value and to inform whether the artifact/monument can be moved:

- In case the Evaluation study confirms that the cultural heritage is of high value and cannot be moved, KTDP will conduct an engineering feasibility study to inform whether a rerouting is possible and financial viable;
  a) In case the heritage is of high value and a rerouting is feasible, KTDP will reroute the canal, main etc. to avoid impacting on the high value cultural site;
  b) In case the heritage is of high value but a rerouting unfeasible KTDP will follow the procedure outlined in chapter 5.1.3; and,
- In case the Evaluation concludes that the cultural heritage is of moderate or low value KTDP will follow the procedure outlined in chapter 5.1.3.

5.1.3 Rescue Work Procedure for Unavoidable Impacts

Cultural heritage that cannot be avoided and that have been categorized to be of moderate or high value will be subject of an Evaluation to confirm/validate their categorization and to inform whether they can be moved or not. Based on this information, KTDP will suggest to the Director General of the Department of Archaeology and Museums to conduct Excavations of all high value cultural heritage, to move all movable moderately and high value artifacts and to leave unmovable cultural heritage of moderate value and all cultural heritage of low value as they are.

Based on the decision of the Director General, KTDP will deploy teams of at least two qualified archaeologists to excavate all designated sites.

The purpose of excavation is to examine the cultural heritage resource within the given setting to a) seek a better understanding, b) compile a lasting record of that resource, c) analyze and interpret the results and d) disseminate them. KTDP will use at least two qualified and experienced archaeologists to conduct the Excavation in line with national legislation and international best practice using a hand-excavated open areas and/or trenches, b) machine-stripped and hand excavated open areas and/or trenches and/or c) auguring and probing. KTDP will use the methods fit for the specific site.

For each site KTDP will produce a site summary report that documents all findings (written, graphic, electronic and/or photographic) using pro forma records that relate the excavation to the national grid and the ordnance survey datum, relate all plan and section drawings to the site grid, maintain written registers of all plans, drawings, photographs, special finds, samples etc., and compile records on suitable, durable materials. The level of detail required in these site summary reports will commensurate with the quantity and complexity of data and the extent to which those factors have required additional study of the material in order to form a reliable assessment. The site summary reports (see Annex 3) will be submitted to the Department of Archaeology and Museums within one months of completion of the fieldwork.

The archive, including all retained artifacts and eco-facts, are the property of Pakistan, will be treated and packaged in accordance with the requirements of the Department of Archaeology and Museums and handed over to the Department of Archaeology and Museums within three months after the end of the completion of fieldwork.

Any human remains, mortuary/funerary objects and/or burial sites found will be treated with the utmost respect. If such remains are assessed as recent (newer than 1913 CE) every possible attempt will be made to identify and contact living descendants or kin. If found they will be provided with an opportunity to decide on whether the grave should be removed or remain at location and consequently inundated or destroyed. Descendants will be further consulted regarding the procedure for final disposition of the remains and associated funerary items. If no descendants are found within seven days of the discovery, the remains will be exhumed and temporarily-stored in a secure location on site. If no descendants are found within 30 days or it is determined that the remains can be securely dated to a period before 1913, the remains and any accompanying objects will be treated in accordance with the applicable standard and Sharia regulations.

5.1.4 Late Find Procedures

Contracts for civil works (construction of dam, power houses, access roads etc. as well as excavations of canals, mains and other water ways in the command areas) are required to follow this late find procedure in case they encounter any movable or immovable objects, sites, structures or groups of structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.

The most difficult step is to assure that indeed any find triggers the application of this process as untrained workers are often not able to differentiate between normal environmental features (stones etc.) and for example paleontological finds. Therefore, the resident archaeologists and their team will carry out trainings to sensitize the work force and be available on call at any time to verify whether a finding is of any significance from a cultural heritage perspective or not. To even reduce the time to obtain feedback an archaeologist shall be based on site for all works close to known cultural heritage sites or AHAP that have been rated as significant in Chapter 3 of this CHPP.

If a cultural resource comes to light during the works, the contractor shall stop the works in all areas 50 m around the discovery. After stopping work, the contractor must immediately report the discovery to the resident engineer, who in turn calls the resident archaeologists. The resident archaeologists shall identify and verify the finding, assess its significance and decide to either suspend work on this site and/or larger areas around it or to remove the finding (in case it is a easily movable object such as a coin etc.) and allow the work to continue. The contractor shall be entitled to claim compensation for this work suspension.

The resident archaeologist will then establish with 48 hours a Late Find Report and submit it to the dedicated representative of the Department of Archaeology and Museums. This report needs to contain the following information:

- Date and time of discovery;
- Location of the discovery;
- Description of the discovery;
- Significance of discovery;
- Estimated weight and dimensions i.e. feasibility to move the discovery;
- Estimated time needed to conduct Excavation of discovery;
- Recommendation of how to proceeds; and,
- Temporary protection implemented.

The Department of Archaeology and Museums will ensure that a Representative will arrive at the discovery site within five days to determine the action to be taken. If the Representative of the Department of Archaeology and Museums fails to arrive within the prescribed time, the resident

archaeologists have the authority to take the recommended action. Such actions may include, but not be limited to:

- If feasible - removal of artifact/cultural site deemed to be of high or moderate significance;
- Execution of further excavation within a specified distance of the discovery point of sites deemed to be of high significance following the provisions outlined in chapter 5.1.3; and,
- Decision to continue with the construction work.

The decision should be taken within five days to reduce costs triggered by the stop work decision. The contractor shall be entitled to claim compensation for this work suspension.

5.2 Monitoring and Evaluation

All cultural heritage work will be constantly monitored by the Department of Archaeology and Museum and periodically by an international cultural heritage specialist against the specifications outlined in this CHPP. Whilst these monitors may choose to visit at any time, they should normally inform the resident archaeologists of any intended visits in advance. Similarly, monitors should respect reasonable requests from KTDP to attend only at pre-arranged times and, if necessary for safety and security reasons, in the company of KTDP representatives. Any costs for monitoring will be covered by KTDP.

Key elements to be monitored and its key performance indicators (KPI):

Table 5-2: Key Performance Indicators

Activities	Outcomes	Elements	KPI
Identification and classification	All land is assessed 3 month before the start of construction on this land	Status of identification studies and classification	% of land covered against schedule; Nr of consultation with local communities
Rerouting of canals etc.	No last second rerouting is needed	Status of reroutings of canals etc.	% of area covered, % of identified issues assessed in detail including feasibility study, % of cases solved by rescue excavation and rerouting
Rescue excavation	All excavations of relevant cultural heritage sites are finished 3 months before the start of construction	Status of rescue excavation	% of identified sites excavated against schedule, % of reports submitted, quality of reports
Late find procedure	The procedure assures that no high value cultural heritage is destroyed	Effectiveness and efficiency of process	System in place, Nr of contractors trained, Nr. of findings, confirmed findings, rescue excavation and reports produced, Average duration between finding and valuation, action taken.
protection/relocation of cultural heritage sites	All relevant cultural heritage sites are protected	Status of protection measures	% of shrines, graves and mosques relocated/rebuild, time needed for relocation, satisfaction of users of living relocated cultural heritage sites
Quality assurance	The outcome complies with international standards		Nr. of review of results of evaluations, excavations and relocations conducted

6 ROLES AND RESPONSIBILITES FOR IMPLEMENTATION

KTDP is fully responsible for compliance with this CHPP while the responsibilities for implementation are divided between KTDP staff (for upfront work and supervision), contractors (for the implementation of late find procedures) and the Department for Archaeology and Museums for Quality Assurance.

Within KTDP responsibilities will be shared as follows between:

- WAPDA is responsible for all work related to the dam, weir, reservoir, transfer, main and secondary canals as well for overall project development;
- Department of Irrigation is responsible for all Command Areas including tertiary canals;
- Department of Public Works is responsible for all roads; and,
- PEPCO for all transmission lines

Within these organizations the

- General Manager has the overall responsibility for ensuring implementation of Cultural Heritage Protection Plan at all sites and by contractors and staff.
- Environment and Social Manager (head of Environmental and Social Cell) shall lead the implementation of the CHPP.
- Human Resources Manager shall ensure that all employees are aware of, and appropriately trained on CHPP and include cultural heritage into induction training.
- Procurement Manager shall ensure that all contractors and subcontractors are aware of, and appropriately trained on CHPP.
- Approvals Manager shall seek the necessary official approvals before any work is conducted on any cultural site, and is the liaison officer between KTDP and government and regulatory agencies.
- Communication Manager shall lead the reporting and disseminating of all information related to the performance against this CHPP to internal and external stakeholders and for leading dispute resolution and compensation processes.
- Resident archaeologist (two people working back to back to assure availability at all time) shall be responsible for the activities outlined in chapter 5.1 and for selecting, training and supervision of survey and excavation teams.
- Department for Archaeology and Museums shall delegate representative to supervise compliance with national legal framework (costs shall be covered by KTDP under a special fund established for that purpose).
- Independent external monitor (an experienced international cultural heritage specialist) shall be in charge to review progress made and results against international standards and recommend ways to enhance performance.

All KTDP personnel and contractors will receive training in the Late Finds Procedure and familiarization with the laws and procedures protecting cultural heritage in Pakistan on joining the project and at various times during their employment (refresher training). Specific training on cultural heritage artifact identification and protection is provided to the personnel and supervisors involved in or overseeing earth moving or ground intervention activities.

To put in place the necessary competences and resources, WAPDA as lead implemented of KTDP shall deploy an international cultural heritage specialist within two months after financing becomes available for any Component or Subcomponent to conduct a comprehensive assessment of the capability of the various implementing partners. This assessment shall cover the implementing partners as outlined above and include potential contractors such as the Frontiers Organization etc. The assessment shall be performed against the minimum requirements needed to successfully

implement this CHPP. Based on this, the expert shall establish a detailed training and recruiting program and provide an initial sensitization to prepare the existing staff for the upcoming work.

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ANNEX 2: IDENTIFICATION SURVEY AND CLASSIFICATION

In line with common standards each site will be recorded using the following formal:

Basic Information	Personnel Present (name and organization):	
Date:	1)	5)
Name of Investigator:	2)	6)
	3)	7)
	4)	8)
Survey Area:	5)	10)

Name and Brief Description of Site:	Coordinates: N E Source:	KP of canal/main:	Site Importance & Quality rating:
		In Footprint: Offset (ft, left or right):	Estimated Period & Cultural Affiliation of Site:
		CH Site Code:	Estimated Dimensions of Site (ft):

Site Observations	
Description of artefacts, artefact density, surface structures, topography, ground cover, reasons for estimations of age, size, and cultural affiliation, etc: Take photos of Site. Include Site Evaluation Form number as part of the jpg photo label.	Photos Y / N? (circle one) Site Photos:
Recommendations	
Description of recommendations for mitigation, i.e. (reroute, salvage, signage, further investigation, etc…):	

Each of these sites shall be registered in a Cultural Heritage Index using a formal similar to the following

N	**E**	**CH-Nr**[4]	**meter to footprint**	**Site Type**	**Description of Site**	**Period**	**Associated AHAP**	**Importance/ Quality**

[4] **Site types:** Archaeological Site (A), Monument (M), Site with Intangible Cultural Heritage value (ICH), or Area of High Archaeological Potential (AHAP); **Importance/Quality**: High (H), Medium (M) or Low (L)

Each of the identified sites shall be evaluated using the following criteria:

Type of site	Low	Moderate	High
Archaeological Site	Limited informational value and/or cultural significance based on content and condition of site.	Moderate informational value and/or cultural significance based on content and condition of site.	High informational value and/or cultural significance based on content and condition of site. Meets criteria as Critical Cultural Heritage or Nonreplicable Cultural Heritage.
Monument	Limited visual, commemorative or art historical interest based on architectural style or degree of preservation	Moderate visual, commemorative or art historical interest based on architectural style or degree of preservation.	High visual, commemorative or art historical interest based architectural style or degree of preservation. Meets criteria as Nonreplicable Cultural Heritage
AHAP	While it seems likely that this site was used for human habitation it seems unlikely to contain any antiquities of significant	Likely location of an undiscovered cultural site. Similar locations contained moderately interesting artefacts	Likely location of an unknown cultural heritage site that could potentially contain significant information
Living cultural resource	Limited cultural or religious significance to site users based on user criteria.	Moderate cultural or religious significance to site users. Meets criteria as Critical Cultural Heritage	High cultural or religious significance to site users. Meets criteria as Critical Cultural Heritage, and is either recognized as an important symbol of culture and identity, or as a uniquely important site for a particular group (community, ethnic group, minority religious group, etc…)
Site with Intangible Cultural Heritage Value (IGH)	Limited cultural or religious significance to site users based on user criteria.	Moderate cultural or religious significance to site users. Meets criteria as Critical Cultural Heritage	High cultural or religious significance to site users. Meets criteria as Critical Cultural Heritage, and is either recognized as an important symbol of culture and identity, or as a uniquely important site for a particular group (community, ethnic group, minority religious group, etc…)

ANNEX 3: SUMMARY REPORT OUTLINE FOR RESCUE EXCAVATIONS

The site summary reports will be submitted to the Department of Archaeology and Museums within one months of completion of the fieldwork and include but not limited to:

1 Introduction:

- Scope.
- Circumstances and dates of fieldwork and previous work.
- Comments on the organization of the report.

2 Summary of the documented history of the site

3 Summary of the site archive and work carried out:

- Site records: quantity, work done on records during assessment etc.
- Finds: factual summary of material and records, quantity, range, variety, preservation, work done during assessment.
- Environmental material: factual summary of human and animal bone, shell and each type of sample (eg bulk organic, dendrochronological, monolith), quantity, range, variety, preservation, work done on the material during assessment.
- Documentary records: list of relevant sources discovered, quantity, variety, intensity of study of sources during assessment.

4 Potential of the Data:

- A discursive appraisal of the extent to which the site archive might enable the data to enhance our understanding of the history of the area. Different classes of data should be discussed in an integrated fashion.
- A statement of the potential of the data in developing new research aims, to contribute to other projects and to advance methodologies.

5 A summary of the potential of the data in terms of local, regional, national and international importance.

Additional information shall include:

- Supporting illustrations at appropriate scales.
- Sufficient supporting data, tabulated or in appendices, and/or details of the contents of the project archive, to permit the interrogation of the stated conclusions.
- Index, references and disclaimers.