Initial Environment Examination-Jay Kalay Dam (IEE)

August 2014

PAK: Federally Administered Tribal Areas Water Resources Development Project (FWRDP)

Prepared by Federally Administered Tribal Areas, Secretariat, for the Asian Development Bank.

Abbreviations

ADB	Asian Development Bank
APA	Assistant Political Agent
BMP	Better Management Practices
CO	Community Organization
CE	Construction Engineer
CCA	Culturable Command Area
DEM	Digital Elevation Model
DG	Director General
EIA	Environmental Impact Assessment
EMU	Environmental Management Unit
EMP	Environment Management Plan
EPA	Environment Protection Agency
ECR	Environmental Complaints Register
FRDP	FATA Rural Development Project
FWRDP	FATA Water Resources Development Project
FATA	Federally Administered Tribal Areas
FGD	Focus Group Discussions
GIS	Geographic Information System
GoP	Government of Pakistan
GRC	Grievance Redress Committee
GFP	Grievance Focal Point
GRM	Grievance Redress Mechanism
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
GF	Inspector General Forests
JKDIP	Jay Kalay Dam Irrigation Project
KII	Key Informant Interviews
KPK	Khyber Pakhtunkhwa
MMT	Main Mantle Thrust
NGO	Non Governmental Organization

NOC	No Objection Certificate
PA	Political Agent
PEPA	Pakistan Environmental Protection Act
PPTA	Project Preparatory Technical Assistance
ToP	Terms of Partnership
ToR	Terms Of Reference
WWF	World Wide Fund for Nature

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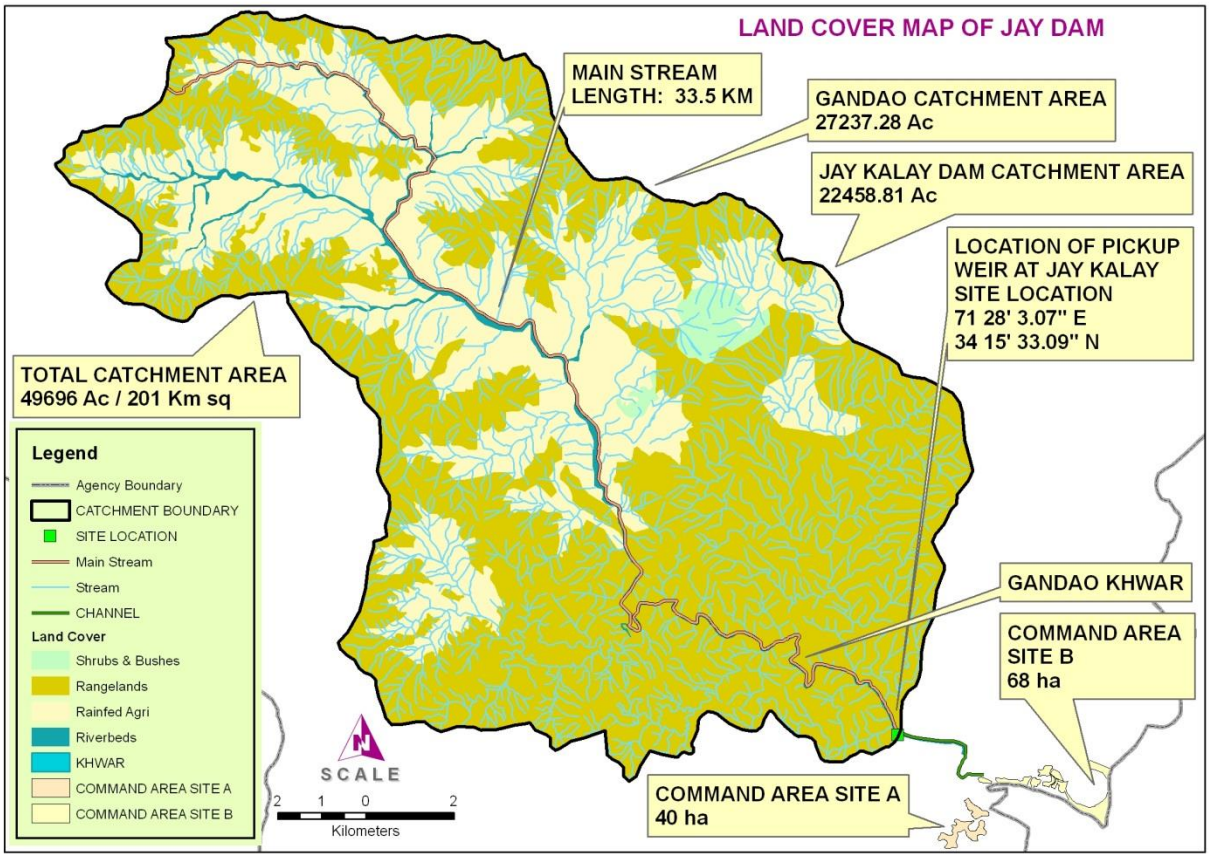

LAND COVER MAP OF JAY DAM
MAIN STREAM
LENGTH: 33.5 KM
GANDAO CATCHMENT AREA
27237.28 Ac
JAY KALAY DAM CATCHMENT AREA
22458.81 Ac
LOCATION OF PICKUP
WEIR AT JAY KALAY
SITE LOCATION
71 28' 3.07" E
34 15' 33.09" N
TOTAL CATCHMENT AREA
49696 Ac / 201 Km sq
Legend
Agency Boundary
CATCHMENT BOUNDARY
SITE LOCATION
Main Stream
Stream
CHANNEL
Land Cover
Shrubs & Bushes
Rangelands
Rainfed Agri
Riverbeds
KHWAR
COMMAND AREA SITE A
COMMAND AREA SITE B
SCALE
2 1 0 2
Kilometers
GANDAO KHWAR
COMMAND AREA
SITE B
68 ha
COMMAND AREA SITE A
40 ha

EXECUTIVE SUMMARY

THE PROJECT

1. The proposed Jay Kalay Dam Irrigation Project (JKDIP) is located in Mohmand Agency, a Federally Administered Tribal Area (FATA) in northwest Pakistan. The dam will be constructed on Gandao Khwar, a semi-perennial tertiary stream, which after draining into secondary and primary streams, eventually falls into Kabul River. The site is located about 7km South East of Ghalanai Town (Agency Headquarter) near the village of Jay Kalay. The dam is proposed at coordinates of $34^0$15' 33.09" N and $71^0$28' 3.07" E.

2. The catchment area of the Dam is approximately 201 km^2. The length of the main stream is about 33.5 km. Catchments are characterized as hilly with highest altitudes of 1205.47 m (3954.96 ft) AMSL. The nullah bed comprises of boulders, shingle, gravel and coarse sand. The area has a steep gradient, with scattered settlements in small pockets.

PROJECT OBJECTIVES

3. The main objective of the JKDIP is to develop flood runoff storage for assured irrigation supplies to Culturable Command Area (CCA) of approximately 191 ha/ 471 acres, downstream of the dam. It is estimated that a reasonable quantity of water from the dam will meet the irrigation demand of lands proposed in the command area, and also contribute to recharging the groundwater table.

4. The main component of the sub-project consists of a 15m high and 118.22 m long plumb concrete gravity dam to store the flood water, creating a gross storage of 273,526 m^3.

5. The project also includes a watershed management component to ensure continuous water quality and quantity, and to decrease the sedimentation load. The catchment area consists of 327 ha riverbed, 274 ha shrubs, 12,994 ha rangeland/forest area and 6524 ha agricultural land. Forests and rangeland management activities, along with soil conservation works will be carried out upstream the JKDIP. Community Organizations (Cos) will be formed, and will become a part of the larger Watershed Management Committee that will comprise of relevant stakeholders from FATA Secretariat, Forest Department, and Political Administration. Watershed Development Plans will be developed by these Committees, and endorsed by the COs. These Plans will earmark the responsibility of each stakeholder.

CONSTRUCTION PLAN

6. The main components of Jay dam project include geotechnical investigation, foundation preparation, and construction of the main dam embankment, ogee shaped spillway with stilling basin at the downstream, intake and outlet structures and irrigation system.

7. These components are proposed to be constructed in various stages. The geotechnical investigation will be carried out first, while construction of civil works will be carried out after design review. Stage I will comprise of the preparation of foundation for the main dam, and construction of the grouting curtain and left section of the main dam. Stage II will include the construction of the main dam body, the spillway and stilling basin and the irrigation system. The Dam and its associated structures will be commissioned on completion of Stage-II.

ASSESSMENT OF LEGAL AND POLICY FRAMEWORKS

Asian Development Bank (ADB)

8. JKDIP has been classified ADB environmental category B. Category B projects require initial environmental examination (IEE), which determines whether or not there are potential significant environmental impacts warranting an EIA. If there are none, the IEE becomes the final environmental assessment report.

Pakistan Environmental Protection Act (PEPA), 1997, Government of Pakistan (GoP)

9. The Pakistan Environmental Protection Act (PEPA) 1997 covers the entire country including all its territories. Schedules I & II of the Act describe the criteria for determining the environmental assessment requirements (IEE or EIA) for various types of projects. The criteria qualify JKDIP as requiring an IEE. This IEE is to be submitted to the Pakistan Environment Protection Agency (Pak EPA) for vetting and a no objection letter to initiate civil works and construction phase.

DESCRIPTION OF THE ENVIRONMENT

10. The studied area for this IEE was broadly the Mohmand Agency, and more specifically sub-project location including Jay Kalay and Aqrab Dagh settlements, and the catchment of the Gandao Khwar, stream on which JKDIP is proposed to be constructed.

11. Total projected population of Mohmand Agency is 334,453, out of which 52% is male and 48% is female. The average household size is around 9 persons per family. According to the 1998 population census, the entire Agency is classified as rural.

12. The project site is situated in Upper Haleemzai tehsil, having a population of approximately 1215 people, and 133 households. Haleemzai is the main tribe in the area and is further sub divided into three sub-sections that is Hassanikor, Krappakor, Hayatikor

13. FATA has a unique governance status in Pakistan, with limited presence of state functionaries at the local level, especially line departments for environmental management. Apart from PEPA and Pakistan Trade Control of Fauna and Flora Act, 2012, none of the other laws pertaining to environmental management govern FATA. Hence, there is extremely limited information on species distribution and abundance in the region. FATA Secretariat has a Forestry Unit, which is only involved in afforestation activities, and maintains basic data of forest area in the region. However management of the available forests and rangelands is under tribal control, as there are no state designated reserves or protected areas. The only data available on water, soil, agriculture, climate and watersheds is from the Water Assessment Study and Management Plan[1].
14. For the purpose of this IEE, detailed deliberations were held with relevant stakeholders from the state, civil society and academia. A focused primary survey was also conducted to ascertain species distribution and abundance along with a very basic hazard mapping exercise.
15. As a result, an effort was made to establish a baseline or state of environment for the three selected agencies, with a focus on sub-project site locations. Having stated the above, there are still limitations to the accuracy and authenticity, since in numerous cases, sources for data are singular and cannot be cross verified due to paucity of reliable sources.

ENVIRONMENTAL IMPACTS AND MITIGATION

16. Most of the environmental impacts of JKDIP will be associated with the construction phase, which would be dealt with mitigation measures proposed in the environmental management plan (EMP). Excavation with a limited amount of blasting will be carried out but since the project is not located in any protected area or near an archeological site, the adverse impacts can be reversed and mitigated.
17. The air quality of the area is found to be clean, and no obvious source of pollution was found near the site. Management of vehicular and machine related emissions as well as dust suppression will be made the responsibility of the contractor with relevant clauses embedded into all legal contracts.
18. The site is not home to any critically endangered species, nor is a part of larger habitat. The nearest settlements are at a safe distance, and the site is not used as a regular commuting route or meeting place. The contractor will be required to take necessary precautions during the construction phase as advised by the EMP.
19. Sanitation and waste management issues related to labor camps would be dealt with by constructing dedicated facilities in the camp as well as at the construction site. Waste bins,

[1] Water Assessment Study & Management Plan, Bajaur, Khyber and Mohmand, published by ADB and FATA Secretariat, produced under the ADB FATA Rural Development Project (FRDP)

latrines and pits will be dug for different purposes of solid and liquid waste management. Drinking water facility will also be provided, and will be made the contractors' responsibility.

20. Although the site is located in a volatile, tribal region, no social conflicts exist at the moment. Regular interaction with the political setup and tribal elders will be ensured by the project team so as to deal with any conflict in an amicable manner.
21. Information disclosure will be ensured throughout the design, construction and completion phases, with a culturally suitable and effective grievance redress mechanism in place.
22. The proposed project will bring about a net positive benefit in terms of improved water resource management and agricultural productivity in the area. Continuous environmental monitoring will be carried out for the entire construction phase, to ensure due diligence of environmental performance. The EMP will also ensure reporting of all non-conformances and their rectification within a specified period of time along with safety, health and environment audits carried out by the project team in the leadership of a dedicated Environment Specialist.

CONCLUSION

23. Environmental impacts of JKDIP will not be significant enough to cause any irreversible damages to the ecology of the area. There are potential impacts that have the risk to alter the conditions in the medium to longer term, but this IEE attempts to suggest mitigation measures that would help minimize such impacts.

24. In order to ensure that the impacts remain minimal, EMP compliance monitoring will be critical; dedicated staff must be engaged as soon as the mobilization for project implementation initiates. EMU must be set up immediately with project mobilization, so that the specialists can start liaison with the Federal EPA as well as initiate vetting the contractual bids. Also, the trainings need to be imparted within the second month as soon as the project staff is hired, especially the technical staff who will supervise the construction phase, as well as the contractors. The second round of consultations with the relevant stakeholders including communities is to be taken up immediately after the establishment of the EMU.

25. During the construction phase, review meetings with contractor staff, project team and EMU are to be conducted regularly (at least on a monthly basis). These meetings are to be facilitated by the Environment Specialist, and all responsible staff should be present and provide feedback on the progress achieved as per EMP.

26. **In conclusion, with the EMP being implemented to its letter and spirit, potential harmful impacts of the project will be minimized.**

Environmental Assessment Report

FATA Water Resources Development Project

Jay Kalay Irrigation Dam Project

A. Introduction

27. Federally Administered Tribal Areas (FATA) Water Resources Development Project (FWRDP) will be operational in the federal territories at the western borders of Pakistan with Afghanistan. It focuses on increasing irrigation supplies in three agencies, namely Mohmand, Khyber and Bajaur, to increase crop production and harvest water sustainably. The project is being proposed as a result of the Water Assessment Study executed under the completed ADB supported FATA Rural Development Project of FATA Secretariat. The study identified 44 watersheds where the groundwater aquifers are depleting at a high rate, even under average weather conditions due to unplanned water extraction for irrigation and other associated purposes. It recommends shifting from groundwater to surface water, which remains totally unutilized, and identified potential sites for small reservoirs and diversion weirs in the 44 watersheds of Mohmand, Khyber and Bajaur Agencies of FATA.
28. The cost of FWRDP was tentatively estimated at $40 million (as per ADB Concept Note for the S-PPTA) with ADB financing of $30 million under a sector loan. The project will (i) construct small reservoirs, diversion weirs and conveyance channels (ii) develop command area, and (iii) improve watershed management.
29. Since the project is categorized as a category B project as per ADB's Safeguards Policy Statement 2009, an Initial Environmental Examination (IEE) exercise is required for each sub-project. The purpose of this report is to present the findings of the IEE of the Jay Kalay Dam Irrigation Project (JKDIP), a sub project proposed for Mohmand Agency. JKDIP is one of the four sub-projects currently being proposed for inclusion in FWRDP.

B. Assessment of Legal and Policy Frameworks

1. Asian Development Bank (ADB)

30. JKDIP has been classified ADB environmental category B. Category B projects require initial environmental examination (IEE), which determines whether or not there are potential significant environmental impacts warranting an EIA. If there are none, the IEE becomes the final environmental assessment report.

2. Pakistan Environmental Protection Act (PEPA), 1997, Government of Pakistan (GoP)

31. GOP enacted PEPA in 1997, and it covers entire Pakistan, including its territories. Schedules I& II of the Act describe the criteria for various types of projects so as to qualify them for an IEE or an Environmental Impact Assessment (EIA). Table 1 describes the criteria, reproduced from the Act, and qualifies JKDIP as requiring an IEE. This IEE is to be submitted to the Pakistan Environment Protection Agency (Pak EPA) for vetting and a no-objection letter to initiate civil works and construction phase.

Table 1 Environmental Classification of JKDIP in accordance to PEPA 1997

Criteria for conducting an IEE by PEPA 1997, Schedule I	Jay Kalay Irrigation Dam Project
Dams and reservoirs with storage volume less than 50 million cubic meters or surface area less than 8 square kilometers	Yes
Irrigation and drainage projects serving less than 15,000 hectares	Yes

C. Description of the Project

1. Location

32. The proposed JKDIP is located on Gandao Khwar, a semi-perennial tertiary stream, which after draining into secondary and primary streams, eventually falls into Kabul River. Figure 1 explains the drainage of the stream. The site is located about 7km South East of Ghalanai Town (Agency Headquarter) near the village of Jay Kalay. The dam is proposed at coordinates of $34^0$15' 33.09" N and $71^0$28' 3.07" E, as shown in Figure 2.

33. Catchment area of the Dam is approximately 201sq. kms (77.60 sq miles). The length of main stream is about 33.50km (20.81 miles). The perennial flow in the stream ranges from 2.4 to 1.6 cusec. The inflow into the reservoir is based on runoff generated due to rainfall and the perennial flow in the stream. Catchments are characterized as hilly with highest altitudes of 1205.47 m (3954.96 ft) AMSL. The nullah bed comprises of boulders, shingle, gravel and coarse sand. The area has a steep gradient, with scattered settlements in small pockets.

2. Project Objectives

34. The main objective of the JKDIP is to develop flood runoff storage for assured irrigation supplies to Culturable Command Area (CCA) of approximately 191 ha / 471 acres, downstream of the dam. It is estimated that a reasonable quantity of water from the dam will meet the irrigation demand of lands proposed in the command area, and will also contribute in recharging the groundwater table.

35. The main component of the sub-project will consist of a 15m high and 118.22 m long plumb concrete gravity dam to store the flood water. This dam would create a gross storage of 273,526 m3/221.75 acre feet of which 265,903 m3 / 215.57acre feet is live storage. An Overflow Ogee spillway within the dam body has been suggested, due to simplicity in design and construction, and its flood-friendliness. The spillway capacity and width were optimized by flood routing exercise. The reservoir outflow from spillway of 91.44 m / 300 feet width has been worked out as 12,509 cusecs. Ogee shape un-gated spillway has been designed to pass a 1000 year return period flood of 12,509 cusecs.

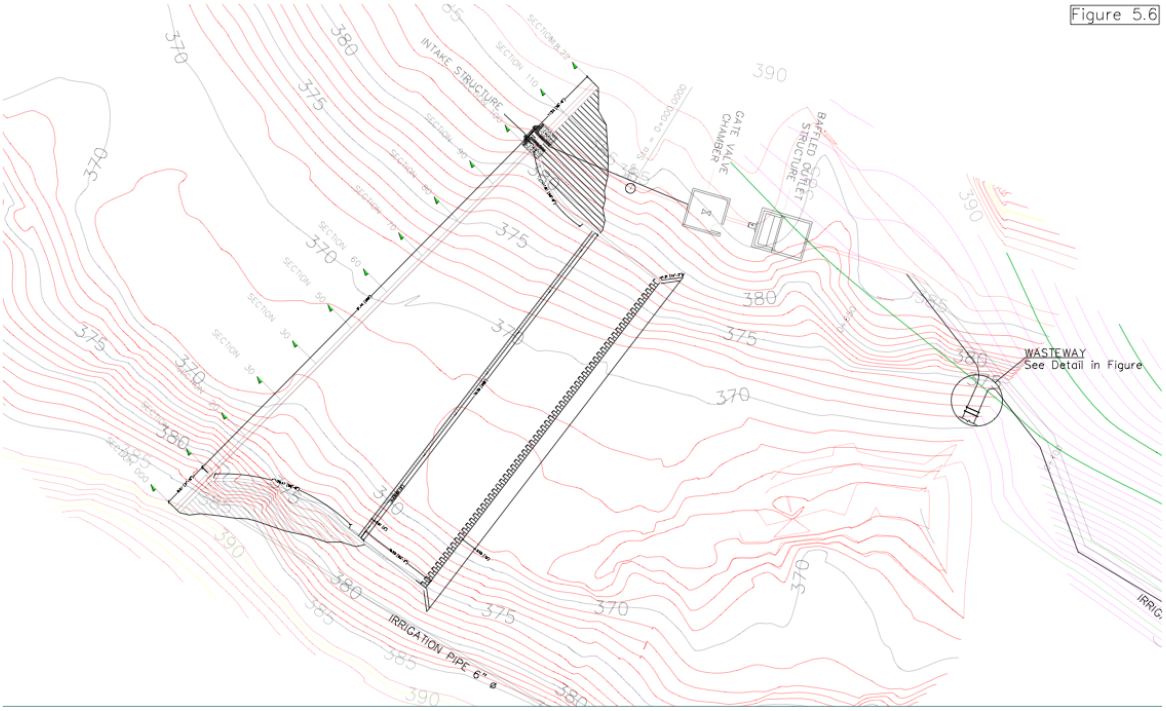


Diagram 1: General Layout of Jay Kalay Dam

36. In addition to the above, a component of watershed management will also be executed, in order to ensure continuous water quality and quantity, and to decrease the sedimentation load. The catchment area consists of 327 ha riverbed, 274 ha shrubs, and 12,994 ha rangeland/forest area and 6524 ha agricultural land. Forests & rangeland management activities, along with soil conservation works will be carried out upstream the JKDIP. Community Organizations will be formed, and will become a part of the larger Watershed Management Committee, that will comprise of relevant stakeholders from FATA Secretariat, Forest Dept., and Political Administration. Watershed Development Plans will

be developed by these Committees, and endorsed by the COs. These Plans will earmark the responsibility of each stakeholder.

3. Construction Plan

37. The main components of Jay dam project include the:

    i. Geotechnical Investigation

    ii. Foundation preparation

    iii. Main Dam Embankment.

    iv. Ogee Shaped Spillway with Stilling Basin at the downstream.

    v. Intake and Outlet structure and

    vi. Irrigation system.

38. These components are proposed to be constructed in two stages. The Geotechnical investigation will be carried out first, while construction of civil works will be carried out after design review. The stage wise break-up of components for construction purposes is briefly described below:

a. Stage-I

i. Preparation of Foundation for Main Dam

39. The foundation preparation will involve excavation in stream/khwar bed and abutments, which mostly constitute of shingle gravel and weathered rock formation. Most of the excavation will be done without blasting, whereas in some places controlled blasting will be employed, avoiding shattering of rock formation.

ii. Grouting Curtain

40. On the basis of Geotechnical investigations double grout curtain will be suggested/revised. Surface treatment of rock and completion of grout curtain at the Jay dam site will be done during this stage preferably during dry season. Perennial flows of stream/khwar will be diverted through proper arrangement.

iii. Main Dam - Left Section

41. Construction of main dam embankment is proposed to commence from left abutment towards the middle and to pipe conduit / Intake level. The RCC Pipe Conduit will be laid through dam body and irrigation channel is to be temporarily re-aligned to RCC pipe conduit for maintaining irrigation flows. Construction of intake and outlet structure will be taken up at later stage.

b. Stage- II

i. Main Dam Body

42. Construction of main dam embankment is proposed to commence from left abutment towards the right abutment in layers and intake pipe would be placed near left abutment. The RCC Pipe Conduit 0.61 m diameter will be laid through dam body and will end in the gate valve structure, from where irrigation channel will lead towards command area. Construction of Irrigation channel and outlet structure will be taken up as parallel activities of this stage.

ii. Spillway and Stilling Basin

43. Construction of spillway and stilling basin near left abutment will be started after construction of outlet structures (d/s of pipe conduit) on the left side of stream/khwar. The crest elevation of spillway has been kept at El.382.187 m with chute channel having 1.76:1(H:V) slope and ending with a USBR type-III stilling basin.

iii. Irrigation System

44. Commencement of activities for the construction of irrigation system will also take place after construction of intake and gate valve structure. This activity will run parallel to other activities onwards till final completion of main dam and other appurtenant structures. Once the main Irrigation channel has been completed, the beneficiaries will be provided with design and layout of field channels falling within the proposed Chack-Bandi of Jay dam. The activity would be mostly carried out by the beneficiaries as part of their Labour and Land contribution.

c. Commissioning of Dam

45. The Dam and its associated structures will be commissioned on completion of Stage-II works and by starting the filling up of the storage reservoir.

D. Baseline Environment

1. Studied Area

46. The studied area for this IEE was broadly the Mohmand Agency, and more specifically sub-project location including Jay Kalay and Aqrab Dagh settlements, and the catchment of the Gandao Khwar, stream on which JKDIP is proposed to be constructed.

47. Information sources for this IEE include:

i. Water Assessment Study & Management Plan, Bajaur, Khyber and Mohmand, published by ADB and FATA Secretariat, produced under the ADB FATA Rural Development Project (FRDP)
ii. Forest Atlas of Pakistan
iii. GIS Database developed by the PPTA GIS Specialist
iv. Primary Surveys conducted under PPTA by Environment Specialist
v. Hydraulic Design Feasibilities conducted under PPTA by Hydraulic Design Specialist
vi. Agriculture and Geological Studies conducted under PPTA by Agricultural Specialist and Geologist
vii. Social Assessment Studies conducted under PPTA by the Social Safeguards Specialist
viii. Meetings with FATA Chief Economist, Forestry Unit, Political Agent Mohmand Agency, Fisheries Department, Monitoring & Evaluation Department, KPK Wildlife Department, Inspector General of Forests, Pakistan, and Director General Pak EPA

48. FATA has a unique governance status in Pakistan, with limited presence of state functionaries at the local level, especially line departments for environmental management. Apart from PEPA and Pakistan Trade Control of Fauna and Flora Act, 2012, none of the other laws pertaining to environmental management govern these territories. Hence, there is extremely limited information on species distribution and abundance in the region. There are no baselines for wild flora and fauna species, and secondary information is scanty and dispersed. FATA Secretariat has a Forestry Unit which is only involved in afforestation activities, and maintains basic data of forest area in the region. However management of the available forests and rangelands is under tribal control, as there are no state designated reserves or protected areas. The only data available on water, soil, agriculture, climate and watersheds is from the Water Assessment Study and Management Plan[2].
49. For the purpose of this IEE, detailed deliberations were held with relevant stakeholders from the state, civil society and academia. A focused primary survey was also conducted to ascertain species distribution and abundance along with a very basic hazard mapping exercise.
50. As a result, an effort was made to establish a baseline or state of environment for the three selected agencies, with a focus on sub-project site locations. Having stated the above, there are still limitations to the accuracy and authenticity, since in numerous cases, sources for data are singular and cannot be cross verified due to paucity of reliable sources.

[2] Water Assessment Study & Management Plan, Bajaur, Khyber and Mohmand, published by ADB and FATA Secretariat, produced under the ADB FATA Rural Development Project (FRDP)

a. Topography of the Area

51. Mohmand Agency lies between latitude 34^{o} 08' and 34^{o} 21'N, and longitude 70^{o}-58' and 71^{o} 42'E, covering an area of 2,296 km^{2}.The Agency is characterized with rugged mountains and barren slopes, with an average elevation of 145 m, and slope being generally from north to east. The drainage pattern is from north-west to south-east with a number of streams initiating from high mountains along Pak-Afghan border. Some parts of the Agency drain into the Kabul River, on the left bank, while the rest drains into the Swat River. Figure 3 shows the land cover of the Agency.

2. Physical Resources

a. Atmosphere

i. Climate

52. Mohmand Agency's weather is hot in summer and cold in winter. The summer season starts in May and ends in August. The winter season initiates in November and culminates in February. The rainfall is scarce and mostly received during winter season.

53. The climate of the project area varies from semi-arid to sub-humid sub-tropical and temperate. Physiographic features, especially altitudes have major impact on local climatic conditions. This is well depicted by the soils and vegetation of the area.

54. The rainfall occurs mainly due to western winds and monsoon. The average rainfall ranges from 300 mm to 1,000 mm, with the usual average annual rainfall being 422 mm. Based on the available climatic data and altitudinal considerations, the project area is classified as semi-arid sub-tropical zone. 15 watersheds of Mohmand Agency fall into this climatic zone. Gandao Khwar falls within the Ekka Ghund-I watershed, where the JKDIP will be constructed. Rainfall is more pronounced as winter-spring rain in this zone. Winter rains are more frequent with lesser intensity and longer duration. Mean annual temperature ranges between 18^{o}Cand 23^{o}C, mean winter temperature ranges between 8^{o}C and 12^{o}C and mean summer temperature ranges between 29^{0}C and 32^{0}C. June and July are the hottest months with mean maximum temperature ranging between 35^{o}C and 40^{o}C. December and January are the coldest months with mean minimum temperatures from 5^{o}C to 1.5^{o}C. Frost occurs for a few days in the month of December, January and February.

ii. Recent Droughts

55. Primary survey, conducted as a part of this IEE, revealed that droughts are common in the area. The last significant drought was of three years duration, from 2009 to 2011. Agriculture and livestock suffered major losses in these years. Many heads of cattle died as well as

food security was threatened due to inability of the rain-fed agriculture to provide harvests even for subsistence purposes.

iii. Air Quality and Noise

56. Sources of air and noise pollution around the sub-project area are minimal. The area is predominantly rural, with no major industrial setups, apart from small scale marble cutting and polishing units. The NEQS for noise in residential areas is 55 dB(A) in the day time and 45 dB(A) at night. Traffic is low, with heavy traffic being minimal. Particulate matter emissions from the small scale marble setups are estimated to be below the maximum allowable level of 500 mg/Nm3 in the National Environmental Quality Standards (NEQS) for Industrial Gaseous Emissions. Levels of smoke, metallic substances and oxides of carbon, nitrogen and sulphur in the sub-project area are also estimated to be below the maximum allowable levels in the NEQS[3].

b. Geology

i. Regional Geology

57. Formations of study area are highly folded and faulted, due to high tectonic movements over centuries. Figure 4 shows the tectonic map of the area. Main Mantle Thrust (MMT) is present in the south-east and Kohistan Fault is present in the North of Mohmand Agency. Quartz veins are concordant to the host rock. These are from 0.15 to 1.5 m in width and up to a maximum of 9 m in length. The veins are composed of quartz; chlorite and manganese quality of manganese varies in different veins. A large variety of rocks occur together in a very disturbed manner. The country rocks are slates, phyilitic slates, phyllites, various types of schists and amphibolites associated with crystalline limestone and marble. Granite, microgranites, pegmatites and diorites have been encountered in the northern and eastern parts of the area. On the basis of lithology, it appears that this part of the meta-sedimentary terrain may be the northern limb of a large eroded fold having connection with the Mullagori structure. The various rock types are serpentinites, pyroxenites and peridotites. Dolerite intrusions are prominent in phyllites and slates. Epidote is frequently distributed in various forms throughout the area. Green and yellowish-green epidote is associated with numerous quartz veins which are mistaken for emerald by the locals. The yellowish brown and greenish-white limestone is thick-bedded to massive and at places contains thin partings of argillaceous material. A substantial part of the limestone is fine to medium-grained, whereas coarse variety is not uncommon. The other types of limestone are dark grey with minute

[3] There is no Environmental Protection Agency (EPA) in FATA, and neither did the IEE Team had the opportunity to measure the ambient air and noise levels due to security concerns. The statements in the section are based on estimates derived from minimum standards provided in NEQS.

reddish spots, and white to light grey with conspicuous dark-gray patches. The ultramafic body seems to have forcefully intruded the greenish and yellowish crystalline limestone and marble. Serpentinite and peridotite are the common rocks in the ultramafic body. Serpentines are light green to dark green, hard and compact but at places, they become talcosic. Peridotite is of whitish-green color, hard and compact, and is mostly serpentinized. Light to dark green schists are exposed in close association with the ultramafic body over a larger part of Pipal area. The schists are thin to thick-bedded, compact and are fractured. Limonite crystals ranging from minute to about one inch cubes are scattered abundantly in the green schist.

ii. Dam Site Geology

58. The mafic and ultramafic rocks exposed in the stream area and surrounding areas are dominantly comprised of gabbros, greenstones/pillow lavas, peridotite, dunite and serpentinite. These rocks sporadically occur in the form of lenses and smaller bodies in the study area. The smaller bodies are few centimeters to tens of meters wide and up to maximum of hundreds of meters in length.

iii. Reservoir

59. The reservoir areas is located just upstream of the proposed dam axis, between the dam axis and the confluence of the main stream of the area. The stream is open to make a sufficient space for the storage of water. The rocks exposed at both the banks of the stream are medium hard, foliated rocks, namely argillite. In reservoir area, rocks exposed at both the banks of the streams are medium hard, schistose rocks. Garnet bearing schist with argillite rocks are mainly exposed on both right and left abutments of the dam. These are grey to black in color, medium to coarse grained, low to medium hard, very closely jointed, while at some places these are highly fractured and even shared. The stream bed at the dam site is covered with overburden. Sandy gravel/boulders, with loose rock fragments and argillite material are present. Average thickness of overburden encountered is approximately 3 meters. Bore hole in nullah bed have been drilled up to 30 meter. The results shows that 3 to 4 meter are loose material beyond which the strata comprise of competent rocks.

c. Soils

60. The Project area consists of a blend of sedimentary, igneous and metamorphic rocks. The most common sedimentary formations consist of sandstone, limestone, shale and conglomerates. These formations can be a source of sedimentation and soil erosion. Metamorphic rocks in the area include schist, slate and marble, and thick patches of pure clay are also significant. The soils are derived mainly from the local weathering of bedrock deposited by streams and rivers, though windblown soil also exists to some extent.

Landform in the area is varied, and includes piedmont, plains, valleys, gravel fans, rough broken land and gullied land. Level areas are loamy, while lowlands are calcareous in nature. The organic matter and phosphorus content are very low.

d. Seismicity/ Earth Quake Hazard

61. Figure 6 shows the seismicity of the area. As can be observed, the Agency lies in the Minor to Moderate Damage areas, with earthquake magnitude of 6 to 7.5. Respondents of the primary survey, residents of Jay Kalay, also confirmed occurrence of minor earthquakes.

e. Surface Water

62. The Water Assessment Study & Management Plan, published by FATA Secretariat and ADB in 2010 is the most detailed and reliable study conducted for water resources development and management for the three agencies of FATA. According to the Study, there are a number of rivers and their tributaries in the project area of Mohmand Agency (as shown in Figure 1) that have perennial flow from snow melt.

63. The following major rivers flow through the project area of Mohmand Agency:

Kabul River (at the boundary of Khyber and Mohmand agencies)

64. Kabul River originates from Chitral, and enters Afghanistan at Arandu, making a semi circle around Kabul City, reaches in the vicinity of Jalalabad where it is called Kunar River. Of late, Government of Afghanistan has planned a multipurpose dam at Kama village near Jalalabad. The proposed Kama dam is expected to irrigate about 40,486 ha in Kunar province. The proposed Kama dam will reduce the flows in Kabul River by 15%4. The construction of proposed Munda dam on Swat River which is a tributary of Kabul River will mitigate the effects of 15% reduction of flows in Kabul river due to Kama dam in Afghanistan.

65. Kabul River re-enters Pakistan in Mohmand Agency and after traversing a few kilometers it turns into a boundary river between Mohmand and Khyber agencies. There are 7 canals off-taking from Kabul River as described below.

Table 2 Irrigation Canals on Kabul River

S.No	Description	Discharge (cusecs)	Length (m)	CCA (ha)
1.	Warsak Gravity Canal	350	93908	55473

[4]NESPAK paper on Western Tributaries of Indus-2007

2.	Warsak Left Bank Canal	45	28041	11604
3.	Warsak Lift Canal	198	662635	40337
4.	Kabul River Canal	450	115610	4440
5.	Joe Sheikh Canal	350	54223	56596
6.	Banda Mohib Canal	46	15285	3124
7.	Zakha Lift Scheme	7	2133	562

66. The Warsak Left Bank Canal irrigates the Qasim Khel watershed of Mohmand Agency. The remaining canals irrigate the settled areas of KPK. Besides these, there are a number of civil canals owned and maintained by communities and run under 'Rewaj-e Aabpashi'.

Swat River (Mohmand Agency)

67. Swat River enters into Mohmand Agency at upper Prang Ghar area from Swat district and after traversing few kilometers in the Agency re-enters settled area at Munda headworks near Shabqadar. There are a number of small inundation civil canals privately run and maintained by the farmer communities. There are five canals off-taking from the river in KPK. The details of irrigation systems on Swat River are given as under:

Table 3 Irrigation Canals on Swat River

S.No	Description	Discharge (cusecs)	Length (m)	CCA (ha)
1.	Fatehpur Canal	35.3	22451	1400
2.	Nipkikhel Canal	150	38770	10264
3.	Upper Swat Canal System	50	446557	159555
4.	Lower Swat Canal System	1766	34102	134420
5.	Doaba Canals System	350	44636	33977

68. There are 15 watersheds in Mohmand Agency, and all of them fall into the semi-arid climatic zone which receives low rainfall. Total surface water available in the Agency for a given

average year is approximately 174.6 MCM, where 111.6 MCM flows out of the Agency unutilized. This water is mostly runoff generated from rainfall. The distribution of watersheds and their salient features are given below.

Table 4Watershed Details

S. No	Watershed	Confining Coordinates		Area of Watershed (km^2)
		Longitude(E) Degree	Latitude(N) Degree	
1	Lower Pandiali	71.38—71.51	34.33—34.45	73.00
2	Lower Prang Ghaar	71.55—71.70	34.35—34.46	99.23
3	Lower Haleemzai	71.26—71.42	34.31—34.41	97.46
4	Khawazai-Baizai	70.98—71.28	34.35—34.59	390.19
5	Upper Prang Ghaar	71.46—71.66	34.33—34.55	201.29
6	EkkaGhund-I	71.32—71.56	34.24—34.37	165.14
7	QasimKhel	71.33—71.50	34.17—34.26	82.31
8	EkkaGhund-II	71.07—71.34	34.26—34.42	117.25
9	Upper Pandiali	70.30—71.52	34.43—34.55	130.67
10	Upper Haleemzai	71.25—71.42	34.38—34.47	80.52
11	EkkaGhund-III	71.29—71.40	34.16—34.28	53.14
12	Safi	71.09—71.33	34.44—34.63	193.38
13	Lakarao	71.09—71.31	34.58—34.73	176.77
14	Shinwari	71.28—71.41	34.53—34.66	108.21
15	Umbar	71.35—71.56	34.51—34.68	219.17

69. In Mohmand, the general pattern of drainage is from north-west to south-east. The entire area is drained by a number of rivers and streams, which ultimately join the Indus system. The natural country slope is from northwest to southeast. The major streams draining the Mohmand Agency are Shamshah, Kamangrah, Pipal, Spinkai Tangai, Chamarkand, Baruno, Guluno, Suran, Mitai, Bagh, Nawagai, Pipal, GhailoDarra, KharalDarra, Karzine, Danish, Gandao, Tangi, Umer Banda, Tarkhai and Shan Darra.

70. Gandao Khwar falls within the Ekka Ghund-I watershed, where the JKDIP will be constructed.

f. Ground Water

71. Unregulated abstraction of groundwater through unplanned construction of tube-wells and dug-wells has considerably lowered the water table and groundwater aquifers are under extreme stress in most of the watersheds in the project area. As mentioned earlier, the geology of the Agency consists of schist and phyllites with inter-bedded metamorphosed limestone. Unconsolidated alluvial deposits are found as valley fill in the terraces.

72. Groundwater is usually found at a depth of 60 - 85 meters, with deepest depth recorded as 150 meters in Lakarao watershed. Annual recharge is 65.47 MCM for an average year, 41.62 for a dray year and 132.6 MCM for a wet year.

g. Water Quality

73. Water tests of the stream show high electrical conductivity, meaning salinity levels were high in the water sample.

h. Ecological Resources

i. Land Use and Land Cover

74. Landuse and landcover of the Agency are depicted in Figure 3. Recent satellite imagery was used to calculate and estimate the landcover of the area, using Digital Elevation Model (DEM) and Spot Imageries. Moreover, data was also obtained from Forest Dept. Land cover and land use of the sub-project site can be seen in Figures 7.

ii. Biodiversity

75. No authentic information or studies are available on biodiversity of FATA. Historical records and primary survey (consisting of Focus Group Discussions (FGD) and Key Informant Interviews (KII) provide some insight to the biodiversity of the area.

Flora

Table 5: Forests Type and Coverage

(ha & %)

Oak	Sub-Tropical Chir Pine	Sub-Tropical Broad Leaves	Plantations	Total
395 (5.3)	1,446 (19.3)	4,022 (53.6)	1,632 (21.8)	7,495 (100)

76. Vegetation in the Agency reflects its climatic classification that is semi-arid, subtropical temperate. Maximum tree types are sub-tropical broad leaves, and shrubs and bushes. Vegetation around the dam site location and command area is mostly shrubs which are also denuded. There are no forests around the area (as can be seen in Figure 7 Land Cover Map of Jay Dam).

Fauna

77. As stated earlier, no baselines on wild mammals, birds and fish species are available for FATA. No comprehensive survey has ever been conducted in the territories by any line department or NGO. For the purpose of this IEE, a primary survey was conducted to

ascertain the distribution of species, and to collect evidence of any sightings. The exercise was based on a questionnaire developed for Key Informants as well as for Focus Group Discussions. Charts and posters, developed by KPK Wildlife Department of mammal and birds found commonly in KPK were used as survey tools, whereby respondents were asked to respond to questions with the help of these pictorial tools.

78. According to the results of the primary survey, under the mammal category, Common Leopard, Pallas cat, Mongoose, Leopard cat, Hyena, Grey wolf, Hare, Chinkara, Jackal, Wild boar and Porcupine have been sighted in the Agency. The hotspots for several of these mammals are the Upper hills surrounding the Jay Kalay, Ekaghund Bazar settlements. Also Lakai Khwar (stream) is said to have visits from several of these mammals. Common leopard was also said to be present in the Agency but no one has sighted any recently. Common leopard, Chinkaras and Hare are also becoming increasingly rare to sight.

79. The birds found in the Agency, as reported by the survey respondents, include Saker falcon, Tawny eagle, Marsh harrier, Peregrine falcon, Long legged buzzard, Sparrow hawk, Red Headed Bunting, Rose Finch, White Throat Dipper, Common Bubbler, Owlet, Western Swallow, Parakeet, Rufous Backed Shrike, Hoopoe, Red Vented Bulbul, White Cheeked Bulbul, Chukar, Grey Partridge, Black Partridge, See See Partridge and Quail. The waterfowls visiting and resident to the area include Yellow Wagtail, Little Ringed Plover, Crested Lapwing, Grebe, Red-Wattled Lapwing, Pied King Fisher, Little Egret, Spoon Bill, Night Heron, Common Snipe, Coot, Indian Shag, Indian Moorhen, White Breasted King Fisher, Pond Heron, Purple Heron, Grey Heron, Black Winged Stilt, Black Stork, Common Crane, Curlew, Sand Plover, Demoiselle Crane, Comb Duck, Red Crested Pochard, Goosander/ Merganser, Ruddy Shell duck, Greylag geese, Mallard, Pintail and Bar Headed Goose.

80. The hotspots for these birds and waterfowls are various irrigation dams, khwars and river beds and banks.

Fisheries

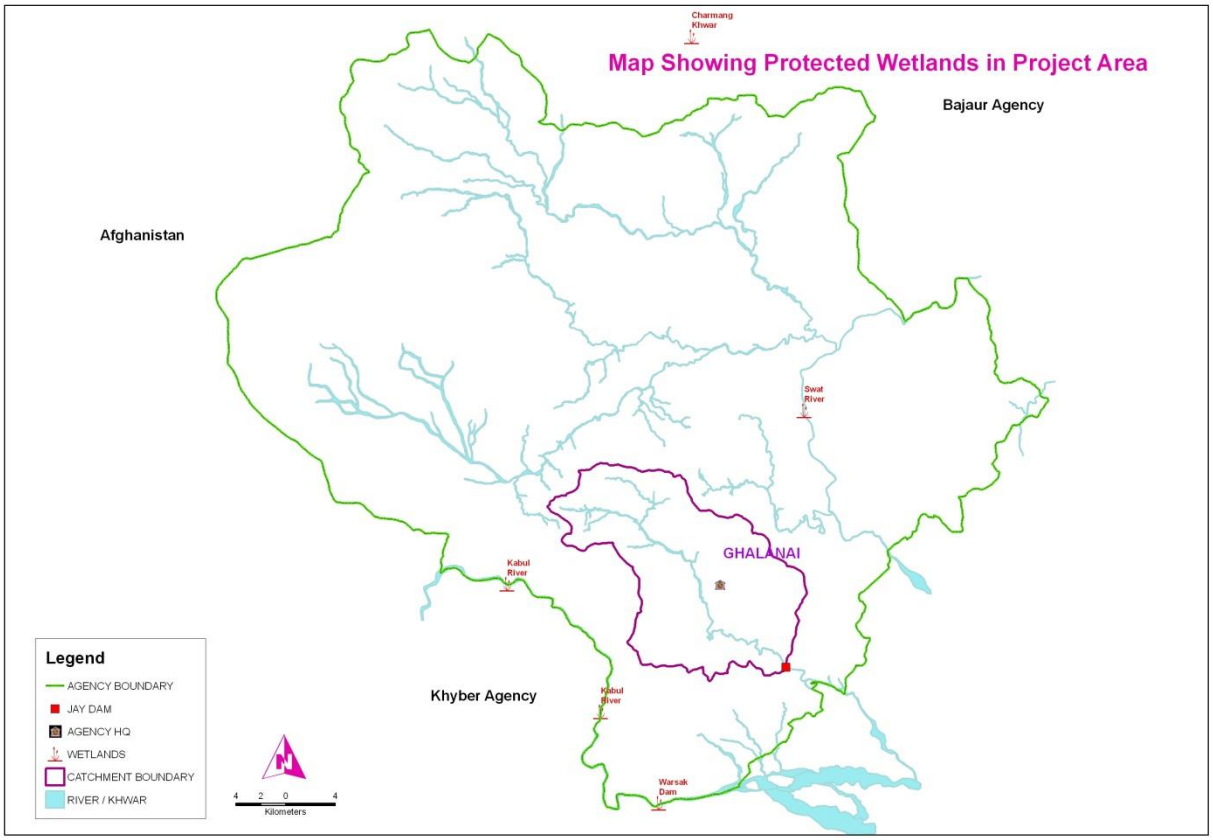
81. Data on fisheries reported here in Table 6, is based on secondary sources since there were no pictorial tools available such as charts and posters to be used for the primary research exercise. Moreover, most of the fish available in the Agency have been introduced by the Fisheries Dept, in order to improve the livelihoods of the locals. Hence making a distinction between culturable and wild fish extremely difficult in the area.

Table 6 List of Wild Fish found in Mohmand Agency (FATA)

S.No.	Local Name	Common Name	Scientific Name
1	Pattay Mahay	Chalwa	Barilius Pakistanicus
2	Katch Paptale	Rosybarb	Puntious Conconchonicus
3	Kattay	Daoly Machlee	Channa Gachua
4	Kategy	Dady Machlee	Channa Punctatus
5	Spena Deqa	Dogra	Crossochelius Diplocheilus
6	Paplate	Gold Fish	Carssius Aurantus
7	Marmahee	Bam Machlee	Mestasembalus Armatus
8	Gulabay/ Sulemanay	Punjabi Pahari	Glypotothorax Punjabensis
9	Hindu Mahay	Sundali	Schistura Alepidota
10	Shermahi	Shermahi	Clupisoma Naziri
11	Gulfam	China	Cyprinus Carpio
12	Mahaseer	Mahaser	Tor Putitora
13	Torkai	Torki	Cirrihinus Mrigala
14	Soul	Katasare	Channa Punctatus
15	Swati	Khauki	Schizothorax Plajiostomus
16	Chadu	Chadu	Barilious Wagra

i. Protected Area

82. As stated earlier, there are no wildlife or forest laws enacted for FATA. However, more recently, Governor KPK has issued a notification, declaring all wetlands in FATA as Community Game Reserves. Hunting shall only be allowed with joint agreement of local communities and political authorities. Following map shows the protected wetlands along with proximity to JKDIP, as per Governor's notification. Moreover, a separate notification has also been issued declaring trade in body parts (pelt, skin, stuffed bodies, trophies, etc.) of all wild fauna including migratory birds as illegal.



3. Social, Economic, and Cultural Resources[5]

a. Demography

83. Total projected population of Mohmand Agency is currently at 334,453 persons, out of which 52% are males and 48% are female population. Average household size is around 9 persons per family. According to the 1998 population census, the entire Agency is termed as rural.

84. The project site is situated in Upper Haleemzai tehsil, having a population of approximately 1215 people, and 133 households. Haleemzai is the main tribe in the area and is further sub divided into three sub-sections that is Hassanikor, Krappakor, Hayatikor.

Table 7 Settlement Details of Mohmand Agency

S.No	Tehsil	Villages	Houses	Average H.H Size	Population No

[5] The section benefits mainly from the Social Assessments carried out under the PPTA, unless mentioned otherwise

1.	Ambarutman Khel	63	3,939	7.8	30,728
2.	Halimzai	35	5,696	8.5	48,418
3.	Pindiali	41	5,894	8.7	51,276
4.	Prang Ghar	16	2,483	7.5	18,620
5.	Safi	37	6,500	11.0	71,503
6.	Upper Mohmand	62	9,009	8.9	80,177
7.	Yaka Ghound	24	3,707	9.1	33,731
Total		**283**	**37,161**	**9.0**	**334,453**

Source: Water Assessment Study and Management Plan, 2010

b. Family Size

85. Average family size in the Project area is calculated as 9 members per household. This clearly reveals the existence of extended family system which is still dominating the rural set up in the Project Area. Field investigation shows that the number of adult male outnumbers the female.

c. Housing Characteristics

86. Majority of the houses (71%) of the study area have ordinary construction (Katcha structure) with timber roof and mud mortar, whereas moderate standard buildings with cement masonry (Pacca structure) and dry stone masonry (semi-pacca structure) are 12% and 17% respectively.

d. Social Organization

87. Society is structured on kinship basis in the Project area. Most of the decisions are made at the household level. The rich and influential people are accepted as community leaders, especially in collective welfare and development of the area. Also, the traditional leader in the village is the “Malik”, the elder who commands respect in the community.

e. The Family System

88. The area has a predominant tradition of joint families with male siblings residing in one household even after marriage. New life style has motivated people towards a nuclear family system, but economic compromises and cultural values restrain them from adopting this type of family system. The family ties are still good and relatively less materialistic. As a social institution, the family is still very strong.

f. Conflicts Resolution Mechanism

89. The edifice of the tribal society rests on certain institutions that have evolved through centuries. These institutions not only hold the Pukhtun tribal society together but also act as instruments of conflict resolution. The Jirga system plays a vital role for conflict resolution in the area. It broadly regulates everyday life of the tribes. All issues are discussed i.e. settlement of land conflicts, social issues, the site of a new mosque and how to interact with other tribes etc. A Jirga in its simplest form is merely an assembly. Practically all community business, both public and private, is subject to its jurisdiction. It acts as a channel for a dialogue or as an intermediary between the government and the people and all matters which need to be discussed and thrashed out with authorities are within the domain of the Jirga.

g. Religious Beliefs

90. All the respondents of the Social Assessment Primary Survey, reported to be Muslim. People generally have conservative outlook on life and are particular in observance of religious ceremonies. Majority of the respondents normally offers prayers and keep fasts during the month of Ramzan. Religious extremism was in full swing for last few years, but the situation is relatively better now. Majority of the population belong to Sunni sect of Islam. They believe in Hanfi interpretation of Shariah. The people have a religious disposition and practice Islam according to its fundamental principles. Inheritance is divided according to the Islamic principles and even daughters are given their property right accordingly.

h. Infrastructure

91. As mentioned earlier, the entire Agency is predominantly rural, with very little public infrastructure. Non-availability of metallic road has hampered the transportation and, consequently the trade activities. Due to the high maintenance cost of the vehicles, transporters demand high fares, which further affect the trading. Construction of metallic road is required to accelerate the economic activities.

i. Cropping Pattern

92. Crops are categorized under two types, Rabi and Kharif, according to their cultivation seasons. Rabi crops are sown in winter and harvested in late winter or during early summer. Kharif crops are sown in summer and harvested in late summer or early winter. The Rabi crops include wheat (major), fodder and few vegetables. Kharif crops include maize (major), fodder and few vegetables. A cropping calendar for FATA is attached as Figure 8.

j. Economic Features

93. Numerous income generating activities are practiced in the Study area, but agriculture remains the major economic activity. Off-farm incomes include wage labor, selling of wood& fodder, operating own business such as running a grocery shop, hotel management, renting out vehicles and government services like teaching, lady health visitors. However, major source of income is farming crops, vegetable and fodder.

k. Livestock

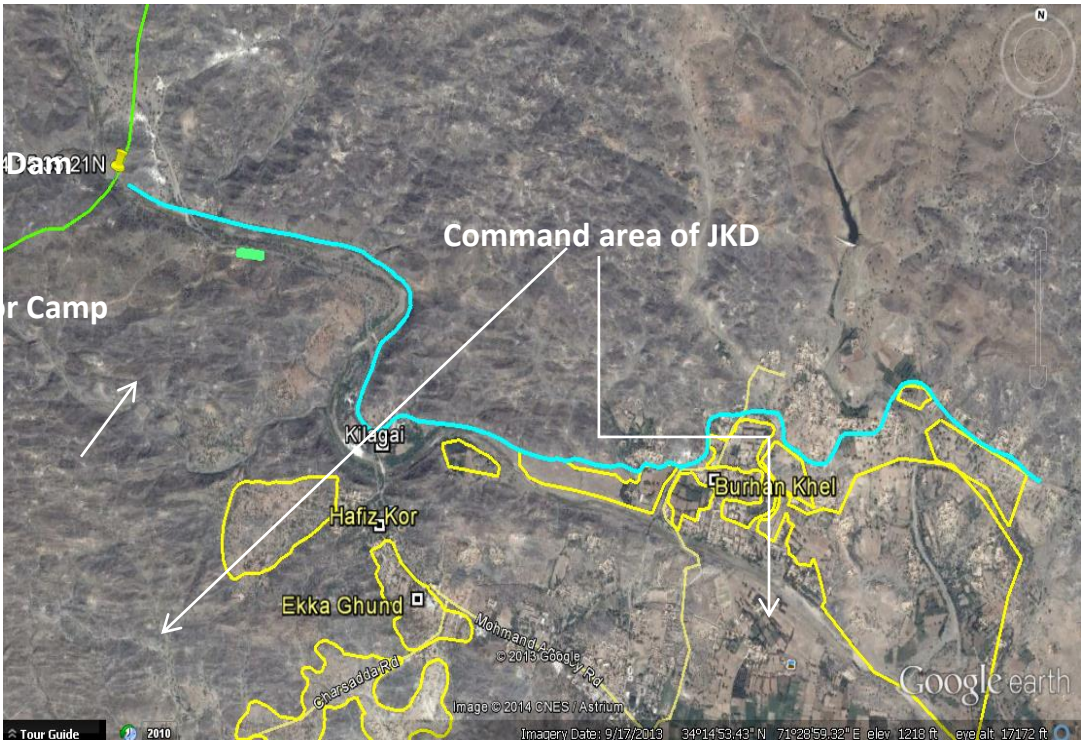
94. Livestock rearing is considered to be an important source of income as well. Like other areas of Pakistan, people practice rearing livestock, as an economic source whereby goat and sheep are reported as the most common animals. In addition, cows, buffalos and horses are also reared to some extent.

l. Culturally and Socially Significant Sites

95. No sites have been reported around the JKDIP site of cultural and social significance.

E. Anticipated Environmental Impacts and Mitigation Measures

96. This section presents likely environmental impacts of the proposed subproject, keeping abreast the various stages of the project lifecycle, and suggests mitigation measures.



97. Above image demonstrates the location of the dam, of the proposed labor camp at a distance of 1 KM, and the command area (yellow polygons) that will be developed by using the irrigation water. The area as can be observed is sparsely vegetated, with the dam site being located in an isolated area.

98. Table 8 considers the potential impacts at various stages of the project, and assesses the category of the impact, classifying them as negligent, moderate or high. Each category is defined as under:

Negligent: No adverse impact

Moderate: Potential impact but can be mitigated

High: Definite impact but can be mitigated

99. The section further goes on to explain the table, by describing those impacts that have moderate to high impact, but can be mitigated.

Table 8 Screening of Environmental Impacts; Construction and Post Construction Stages

Potential Environmental Impacts	Project Stage	Impact Categorization (N=Negligent, M=Moderate, H=High)
1. Land resources		
1.1 Excavation	Construction	H
1.2 Blasting	Construction	M
1.3 Waste generation and disposal	Construction	H
1.4 Labor camps, storage, approach roads	Construction	M
1.5 Soil pollution due to fuel and oil spillage (related to construction machinery)	Construction	H
1.6 Installation of cement mixing plants	Construction	N
1.7 Agriculture land damage	Construction	N
1.8 Leaching of soil nutrients and changes in soil characteristics	Post Construction	N
1.9 Soil pollution due to excessive application of fertilizers and pesticides	Post Construction	M
2. Hydrology and Water Resources		
2.1 Disturbance in stream hydrology	Post Construction	N
2.2 Obstruction of flow of water downstream	Post Construction	N
2.3 Water quality & sedimentation load	Post Construction	H
2.4 Excessive use of irrigation water for cultivating high delta crops	Post Construction	M
2.5 Contamination of water due to farm runoff	Post Construction	N
2.6 Contamination of surface water due to surface water use (for washing machinery and other related materials)	Construction	M
2.7 Drinking water supply	Construction	H
2.7 Municipal waste disposed into the stream	Construction	M
3. Air Quality and Noise Pollution		
3.1 Dust and smoke and other pollutants from plants and equipment	Construction	M
3.2 Smoke from burning of waste or firewood	Construction	H
3.3 Noise control from use of old and/or outdated machinery	Construction	M
4. Biological Resources		
4.1 Damage to flora and fauna	Construction	N
4.2 Impact of dam on aquatic life	Post Construction	N
4.3 Habitat fragmentation	Post Construction	N
5. Socioeconomic and Cultural Issues		
5.1 Tribal tensions and rivalries	All stages	H
5.2 Impact on civic infrastructure (education, health, roads, water supply, electricity)	Construction and Post Construction	N

Potential Environmental Impacts	Project Stage	Impact Categorization (N=Negligent, M=Moderate, H=High)
5.3 Land ownership and tenure	Post Construction	N
5.4Community safety risks due to both accidental and natural hazards	Construction and Post Construction	M
5.5 Health and safety of labor and employees at construction site	Construction	H
5.6 Aesthetic/scenic value	Post Construction	N
5.7 Employment of alien labor	Construction	N

Negligent: No adverse impact, Moderate: Potential impact but can be mitigated, High: Definite impact but can be mitigated

1. Explanation of the Impact Assessment

100. The above table provides a schematic presentation of the degree and significance of various environmental and social factors at construction and post construction phases. This section provides brief explanation of those impacts categorized as having moderate to high impact, also suggesting mitigation measures for the adverse impacts.

a. Construction Phase

i. Land Resources

A. Excavation and blasting

101. Being located in a hilly terrain, the dam will require excavation and blasting for alignment of abutments and land leveling. Such physical work has the propensity to alter the landscape, due to cutting of trees and/or leveling mounds and hills, and also create dust pollution. Moreover use of dynamite also poses risks to the safety of the workers as well as general public as a whole. In case of JKDIP, the site does not have extensive vegetation in terms of trees, but the area is uneven.

Mitigation

102. To be made contractor's responsibility through contract document to minimize cutting of trees, use blasting where it is absolutely necessary, use safety measures in handling explosives, prepare blasting schedules along with warning sirens, and ensure minimum damage to the landscape.

B. Waste generation and disposal

103. Two types of waste will be generated during the construction phase, waste related to construction, and municipal waste as a result of human activity in terms of labor camps and otherwise. Construction waste will involve debris due to cutting of stones and blasting,

residual RCC material and other associated waste. Municipal waste will include both solid and liquid, and would require a management system.

Mitigation

104. The contractor will, in consultation with Construction Engineer (CE) and Environment Specialist, find a suitable landfill site alongside the stream for burying both types of solid waste (construction and municipal). None of the solid waste will be disposed-off into the stream. For municipal liquid waste, septic tanks will have to be constructed within the vicinity of labor camps.

C. Labor camps, storage and approach roads

105. Labor camps are planned to be located at a distance of 1KM from the site, keeping in mind availability of flat surface as well as security. Since the area does not have thick vegetative cover, no clearing of land will be required for the purpose. Stores for various equipment and related materials will also be located next to the labor camp, with proper fencing and demarcation. Since the dam site is located 500 m off the main metalled road (Mohmand Agency Road), approach roads will not be constructed. Primary issue will be the security of labor, safe and secure storage of materials like fuel, dynamite and steel.

Mitigation

106. In consultation with the CE and concerned Assistant Political Agent (APA), the contractor will locate the labor camps and stores, keeping in mind the safety of labor and of material. Also, a sanitation system along with solid and liquid waste management system will be put in place with the advice of the Environment Specialist. Latrines with septic tanks and land fill site for solid waste will be identified and constructed.

D. Soil Pollution due to fuel and oil spillage

107. There is a high risk of diesel and oil spillage while construction machinery is being used, especially when fuel pumping stations are also located at site. Strict rules will have to be followed in order to ensure that such spills do not happen, and if they do, they are dealt with immediately and adequately.

Mitigation

108. The contractor will be required to follow strict rules for minimizing such spilling. Labor associated with fuel filling and storage will have to be trained in optimum filling techniques, as well as penalties will be set for spilling diesel or motor oil. In case of a spill, contractor will follow mitigation measures as per Guidelines for Oil Spill Waste Minimization and

Management issued by International Petroleum Industry Environmental Conservation Associate.

ii. Hydrology and Water Resources

A. Water quality and sedimentation load

109. The soil texture at the JKDIP site is of medium quality with medium organic load. Due to the sand formation upstream, there is a likelihood of sedimentation load filling up the dam.

Mitigation

110. Monthly water sampling and testing will be conducted in order to ascertain water quality during different seasons. A sample each at two locations, one upstream and another downstream of the dam, will be drawn for testing.

B. Use of additional irrigation water for cultivating high delta crops

111. With additional guaranteed supply of irrigation water, there is strong likelihood that the farmers will cultivate high delta crops in this semi-arid, drought prone area. Such practices will not be sustainable in longer term, since the water inflow into the reservoir is dependent on rain run-off, where a dry year can limit the irrigation capacity of the dam. In such a situation, high water demand crops will consume maximum share of irrigation water supply, and leave the farmers unattended for future cropping seasons. Water balance models for the area will need to take heed of this factor, and cropping pattern will have to be developed per se.

Mitigation

112. Cultivation of high delta crops will be strictly discouraged, keeping in mind the semi-arid climate of the area, and the water balance model[6].Cropping pattern in accordance with the water balance model will be suggested and promoted with the help of the FATA Agriculture Department.

C. Contamination of surface water due to washing

113. There is a tendency to wash construction machinery and equipment using the stream water, eventually draining the same into the stream. Contaminants like motor oil, diesel and other such materials pollute the water body in the short run, causing harm to aquatic life, and affecting the overall water quality. Also, municipal waste, liquid and solid, if thrown into the stream has similar impacts.

Mitigation

[6] Water balance models were prepared as part of the Water Assessment Study and Management Plan, 2010

114. Contractor will demarcate a washing area for all sorts of washing activities, with running water facility connected to a dedicated drain flowing into the septic tanks.

D. Drinking water

115. Since the site and adjacent area is away from settlements, there is no connection available to a water supply scheme. There are springs in the catchment of the dam, but they can be far off. Stream water will need to be tested and used for drinking purposes.

Mitigation

116. Contractor, under the guidance of Environment Specialist, will get stream water tested for chemical and biological contaminants, and assist in providing filtration to make water drinkable. There are numerous cost effective water treatment models available in order to mitigate chemical and/or biological contamination. Sand filtration, UV treatment and oxidation are a few such methods.

E. Municipal solid and liquid waste

117. Municipal waste generated due to human activity is a concern if it is disposed and drained into the stream.

Mitigation

118. Solid waste bins will be placed at labor eating and resting areas. This waste will periodically be collected and disposed into the land fill site dedicated for waste disposal. Latrines and washing areas with septic tanks will be erected by the contractor at the construction site.

iii. Air Quality and Noise Pollution

A. Dust from construction and smoke from plants and machinery

119. Due to nature of the construction, involving excavation, land leveling and clearing, a lot of dust will be produced. Heavy machinery will be used to carry out these activities which will result in vehicular emissions as well as other exhaust fumes. Although the site is located at least 7km from the nearest settlement, dust and emissions will be an irritant for the public using the Mohmand Agency Road, as well as the labor itself.

Mitigation

120. Contractor will be required to sprinkle at least three times a day at all earthen areas, especially where the excavation and land leveling is taking place. The contractor shall also make the best of his efforts to provide machinery in a workable condition that has been well

maintained and emits least possible emissions. The machinery, including vehicles will be maintained regularly during the construction, and checked for emissions.

B. Smoke from burning of waste and firewood

121. Labor will burn waste material and wood for various purposes, including cooking and heating, which will cause smoke, and in some weather conditions smog in the area.

Mitigation

122. Contractor shall strictly ban burning of waste or of wood, especially extracted from nearby shrubs and bushes. He must provide clean fuel to the labor to use for their daily purposes.

C. Noise from use of old/outdated machinery

123. Heavy machinery, which is either old or outdated, or has not been maintained properly, creates lots of noise, in addition to smoke.

Mitigation

124. The contractor will ensure use of newer, well maintained machinery that creates minimum noise and emissions, as per National Environmental Quality Standards (NEQS 2000). Environment Specialist will ensure that this clause is added into the bids and contracts. Night time construction activities will be strictly discouraged, and only be carried out in exceptional cases, with prior permission of Construction Engineer. Noise monitoring will be carried out near sensitive receptors on a monthly basis. The NEQS for noise residential areas is 55 dB(A) in the day time and 45 dB(A) at night. It is recommended that noise levels close to sensitive receptors do not exceed 55 dB(A) during the day time as required by the NEQS.

iv. Biological Resources

125. Overall impact on flora and fauna, aquatic life and on habitat is perceived as minimal by the project. The primary survey carried out under this IEE reported minimal siting of wildlife species in this area, but a detailed survey might be required to confirm the same. During the construction phase, a check will be maintained on possible use or disturbance to the resources around.

Mitigation

126. Environment Specialist together with FATA line departments will ascertain the status of the site area in terms of occurrence of wildlife species, especially flora. And in accordance, recommend a watch and ward system that will be based on partnership between

communities, wildlife department and political administration. Each partner's roles will be specified at the onset, and responsibilities assigned. Till the completion of the survey, contractor will ensure no extraction takes place from the surrounding vegetation for fuelwood or hunting of any birds by the labor employed. If such a case is witnessed, it will be brought to the notice of the project management as well as the concerned APA.

v. Socioeconomic and cultural issues

A. Tribal tensions and rivalries

127. Since the project will benefit a certain number of beneficiaries and their agricultural land, a tendency of rivalry exists which can cause tensions amongst neighboring tribal households. Although terms of partnership have been signed with the intended beneficiaries, the risk will still remain.

Mitigation

128. Project Team along with the Social Development Specialist will ensure continuous liaison with the communities throughout the construction phase of the project, so as to identify any such incident in time. Relevant political authorities will be kept abreast of the progress, as well as any such issue if in making.

B. Community safety risks due to accidental or natural hazards

129. Although there are no settlements nearby the construction site, but risk remains of communities being harmed due to any project activity accidently. Also, since the area is prone to natural hazards including floods, earthquakes and drought, the construction team will pay heed to this risk as well.

Mitigation

130. The contractor will ensure proper signage and fencing in order to limit public access to the construction site. Especially during activities such as blasting and excavation, access will be strictly restricted. Construction site will have a first aid facility with certain staff trained to handle emergencies. The design of the dam has been tested for a 1000 years flood figures, but at the same time, an emergency response plan will be prepared by project in order to respond to any hazard caused naturally or otherwise.

C. Health and safety of labor at construction site

131. Since the project is being constructed at a remote site in the tribal areas, safety of labor will be of prime concern. In addition, adequate measures related to Health, Safety and Environment (HSE) will have to be provided for the labor employed.

Mitigation

132. The contractor will ensure that proper HSE protocols are in place, including protective gear, drinking water, sanitation, energy supply and overall safety for the labor. Evacuation plans in case of fire or any other accidents will also be prepared, and drills carried out to ensure the labor is aware of responding to such a situation.

F. Information Disclosure, Consultation and Participation

133. As suggested earlier, FATA has a unique governance status, whereby all land is owned by tribes inhabiting the areas since generations. Any physical activity hence carried out needs the agreement of the locals, as well as land donation by them. Since it is an egalitarian society, chances of elite capture are minimal and major decisions are taken by Jirga, the tribal administrative and management body.

134. For the overall JKDIP, consultations have taken place between the PPTA Team, FATA Secretariat and local tribes, facilitated by the Political Administration of the Agency. Detailed Terms of Partnership (ToP) have been developed, signifying the roles and responsibilities of all stakeholders and have been signed by the communities.

135. For the purposes of this IEE, meetings were held with various stakeholders, including community representatives. Table 9 provides the list of people met:

Table 9: Consultation Details; List of people met

Name	Designation/Department	Contact Date
1. Mr. Asif Shuja Khan	Director General (DG), Federal Environment Protection Agency (Fed EPA), Islamabad	28/01/14
2. Mr. Syed Mehmood Nasir	Inspector General Forests (IGF), Government of Pakistan, Islamabad	27/01/14
3. Mr. Junaid Khan	Chief Economist, FATA Secretariat, Peshawar	15/01/14
4. Mr. Mian Zakiullah	Director, Monitoring and Evaluation, FATA Secretariat, Peshawar	19/12/13
5. Mr. Ali Gohar	Conservator, Forests, FATA Secretariat, Peshawar	19/12/13
6. Dr. Muhammad Tanveer	Assistant Director, Fisheries, FATA Secretariat, Peshawar	19/12/13
7. Mr. Syed Sadar Shah	Conservator, Wildlife, Government of Khyber Pakhtunkhwa (KP), Peshawar	22/01/14
8. Mr. Ibrahim Khan	Head, KP Program, WWF Pakistan, Peshawar	20/12/13
9. Dr. Ghulam Akbar	Senior Director, WWF Pakistan, Islamabad	21/01/14
10. Dr. Shafiq	Department of Wildlife, Pakistan Forests Institute, Peshawar	06/01/14
11. Mr. Khushal Khan	Political Agent, Mohmand Agency,	07/01/14

	Ghalanai	
12. Mr. Muhammad Farooq	Divisional Forest Officer, Mohmand Agency	07/01/14
13. Mr. Raheel Khan	Community Member, Yaka Ghund	21/01/14
14. Haji Gul Azam	Community Member, Yaka Ghund	21/01/14
15. Muhammad Ayub	Community Member, Yaka Ghund	21/01/14
16. Haji Rehman Gul	Community Member, Yaka Ghund	21/01/14
17. Mr. Shamroz Khan	Community Member, Yaka Ghund	21/01/14
18. Mr. Samin	Community Member, Aqrab Dag	21/01/14

1. Summary of Consultations

136. Federal level stakeholders: IGF and DG Fed EPA, both confirmed that federal laws are either non applicable in FATA, or where they were, as in case of PEPA, the enforcement is weak. Primary reason being the administrative setup prevalent in the territory, whereby the office of the PA is responsible for enforcement of all civil and penal issues. Hence environment is not always their primary concern. There are plans to set up an Environment Cell within the FATA Secretariat in near future, which might improve PEPA enforcement. With respects to forest management, it remains an undecided issue, with the presence of forest officials in FATA as mere service providers than enforcers of related laws. With regards to construction of the dam, both confirmed that the negative impacts of such a dam will be negligible, especially when a watershed management component is part of the project.

137. Line Departments (FATA and KP Government): A wildlife conservation project has been launched for FATA, which is first of its kind, under the management of the Forestry Unit, FATA Secretariat. Conservator Forests also informed about the notifications recently been issued by Governor, KP (administrative head of FATA), declaring wetlands as community game reserves, as well as banning wildlife trade in the agencies. However, absence of any type of baselines, scientific or otherwise was a major concern highlighted by all the line departments. Hotspots for biodiversity are also unknown. Due to which, they could not comment positively or negatively on the impacts of the dam.

138. Civil Society: Similar comments were raised by representatives of WWF and PFI. In the absence of credible information, they are unable to comment on the impact of the dam. However, considering the size and location of the project, and on the basis of informal information that they have of the area with respect to occurrence and abundance of critical wildlife species, they do not see any significant threat posed by the dam.

139. Communities: Community representatives unanimously approved the project, confirming the site is not located within any critical habitat, nor have they sighted any species of special concern, in the recent past. They identified the biodiversity hotspots which are located at

considerable distance to the dam site. They informed that the project was being undertaken with their support, and that prior consultations have already taken place.

140. Future Consultations: Design stage consultations have already taken place, while another round will happen prior to the initiation of construction, with the following objectives:

- To inform the communities of the scope of work, construction schedule, and likely effects the construction activity will have on their routines
- Dissemination of EMP, and anticipated environmental impacts of the project, with the suggested mitigation measures
- Information about Grievance Redress Mechanism, and access of communities to it overall benefits of the project

G. Grievance Redress Mechanism

141. Keeping in mind the unique status of FATA, as well as the low literacy and technological development in the area, a simple but effective Grievance Redress Mechanism (GRM) will have to be designed by the Project Team. It must consist of multiple layers of contact points, from Sub Agency to FATA Secretariat level, with telephone (both stationary and mobile) being the main source of communications, followed by mail. The Political Administration will have to designate a focal point for GRM, so as to facilitate the tribal communities in contacting the Secretariat in Peshawar.

142. A typical Grievance Redress Mechanism, to be established by the project, is described below:

143. FATA Secretariat/Project Director will facilitate the establishment of a Grievance Redress Committee (GRC) and Grievance Focal Point (GFP) at the project location prior to the Contractor's mobilization to site. The functions of the GRC and GFPs are to address concerns and grievances of the local communities and affected parties as necessary.

144. The GRC will comprise representatives from local political authorities (designate focal point by PA), affected parties and other well-reputed persons from related sectors, as mutually agreed with the Political Agent and affected persons. It will also comprise of Contractor's Environmental Specialist, FWRDP's Environment Specialist and Social Development/Safeguards Specialist. The role of the GRC is to address the Project related grievances of the affected parties that are unable to be resolved satisfactorily through the initial stages of the Grievance Redress Mechanism (GRM). The project will also assist affected communities/villages identify local representatives to act as Grievance Focal Points (GFP) for each community/village.

145. GFPs will ideally be designated personnel from within the community who will be responsible for i) acting as community representatives in formal meetings between the project team (including the contractors) and the local community he/she represents, and ii) communicating community members' grievances and concerns to the contractor during project implementation. The number of GFPs to be identified for the project will depend on the number and distribution of affected communities.

146. A pre-mobilization public consultation meeting will be convened by the FATA Secretariat for JKDIP, and will be attended by GFPs, contractor, Political Agents' representative and other interested parties (e.g. Irrigation Dept, NGOs etc). Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below:

(i) Individuals will lodge their environmental complaint/grievance with their respective community's nominated GFP.

(ii) The GFP will bring the individual's complaint to the attention of the Contractor.

(iii) The Contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the presence of the GFP.

(iv) The GFP will discuss the complaint with the Contractor and have it resolved;

(v) If the Contractor does not resolve the complaint within one week, then the GFP will bring the complaint to the attention of the FWRDP's Environmental Specialist. The Environment Specialist will then be responsible for coordinating with the Contractor in solving the issue.

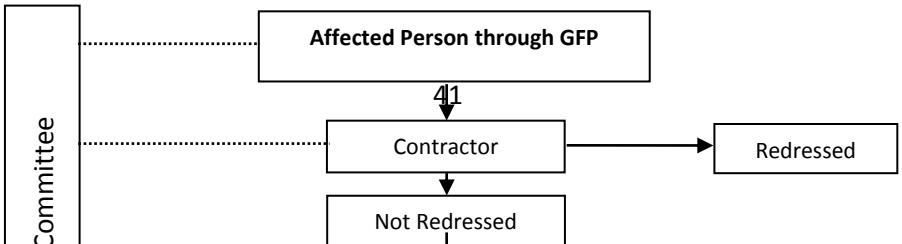
(vi) If the Complaint is not resolved within 2 weeks the GFP will present the complaint to the Grievance Redress Committee (GRC).

(vii) The GRC will have to resolve the complaint within a period of 2 weeks and the resolved complaint will have to be communicated back to the community. The Contractor will then record the complaint as resolved and closed in the Environmental Complaints Register.

(viii) In parallel to the ECR placed with the Contractor, each GFP will maintain a record of the complaints received and will follow up on their rapid resolution.

(ix) If the grievance is not resolved through this process, the issue will be taken to the local legal structures (Jirga, PA Office).

Proposed Grievance Redress Mechanism



H. Environmental Management Plan

147. This section describes the potential environmental impacts, with a set of mitigation measures and the institutional arrangements required to monitor, minimize and alleviate those. An Environment Management Plan (EMP) is a comprehensive plan which describes the mitigation measures to alleviate negative impacts, and enhance positive impacts associated with a given project. Additionally, it suggests frequency, roles and responsibilities for effective compliance and adherence to the Plan.

1. Objectives of Environment Management Plan

148. An EMP serves as the guiding document for the project management to minimize and manage any negative environmental or social impact, and enhance the positive impacts. Its objectives usually are as follows:

- Inform the project team as well as the contractors of the potential impacts, the mitigation measures and the costs involved in implementing the Plan
- Provide guidance on institutional and management structures required to implement the Plan
- Provide compliance requirements, monitoring parameters and frequency of monitoring
- Propose a capacity enhancement plan on areas related to environment and social management

- Enable the Environment and Social Management Team of the project, to ensure and oversee compliance

2. Institutional & Management Structures

a. Environment Management Unit

149. For effective compliance of an EMP, roles and responsibilities need to be defined at the onset, with relevant professionals hired as project team members at the executing or implementing agency (E/IA) levels. Moreover, these professionals are to be placed in the project hierarchy in such a way whereby they cannot be influenced by the operational teams (engineers, procurement, contractors, etc.) in order to lessen their compliance monitoring responsibilities.

150. For JKDIP, an EMU is proposed to be set up within the Project Director's (PD) Office at the EA/IA level, with direct reporting line to the PD. An Environment Specialist and a Social Development Specialist will need to be a part of the EMU so as to ensure compliance to both parts of the EMP. The responsibilities of EMU will be the following, but not limited to:

- Ensure effective compliance of EMP as per ADB Safeguard Policy requirements
- Provide technical assistance to the Project Team, in matters related to EMP in particular, and to environmental and social safeguards as a whole
- Put in place reporting mechanism and monitoring regimes for project staff as well as contractors
- Ensure that EMP related clauses specifically, and environment related clauses in general, are part of all the tender/bid/RFP documents.
- Provide technical input to the various training programs proposed as a part of the EMP
- Ensuring that all regulatory clearances (for example, Fed EPA) have been obtained before starting civil works for the subproject.
- Conduct on site spot checks to check the compliance level, as well as for any outstanding issue not being covered by the EMP
- Regularly report to PD as well as ADB on progress related to EMP Compliance

b. Environment Management Plan (Construction and Operational Stage)

Environmental Concerns	Mitigation Measures	Implementation	Supervision	Cost
IEE Approval	- Submit IEE to Fed EPA for approval and NOC for initiating construction	- Environment Specialist	Project Director	Suggested in Table 12
Land Resources				
Excavation and blasting	- Contractor to be responsible as per contract document to minimize cutting of trees, use safety measures in handling explosives, prepare blasting schedules along with warning sirens, and ensure minimum damage to the landscape.	- Contractor	- Constructor Engineer	Included in the project costs
Construction waste	- The contractor will find a suitable landfill site alongside the stream for burying construction waste. No solid waste will be disposed into the stream.	- Contractor	- Construction Engineer - Environment Specialist	Included in the project costs
Labor camps and material storage	Contractor will - Locate the labor camps and stores, at 1 KM from the site at a secure location. - Sanitation system along with solid and liquid waste management system will be put in place Latrines with septic tanks and land fill site for solid waste will be identified and constructed.	- Contractor	- Construction Engineer - Environment Specialist	Included in the project costs

Environmental Concerns	Mitigation Measures	Implementation	Supervision	Cost
Soil Pollution due to fuel and oil spillage	- Contractor will follow strict rules for minimizing such spilling. - Labor associated with fuel filling and storage will be trained in optimum filling techniques, as well as penalties will be set for spilling diesel or motor oil. - In case of a spill, contractor will follow mitigation measures as per Guidelines for Oil Spill Waste Minimization and Management issued by International Petroleum Industry Environmental Conservation Associate.	- Contractor	- Construction Engineer - Environment Specialist	Included in the project costs except training costs which are included in Table 11
Soil pollution due to excessive application of fertilizers and pesticides	- Agriculture extension programs targeting use of IPM, green manure, and limiting use of pesticides to required levels only will target farmer communities to inform and train them	- FATA Agriculture Directorate	- Project Director	Suggested in Table 12
Hydrology and Water Resources				
Water quality and sedimentation load	- Monthly water sampling and testing will be conducted to ascertain water quality during different seasons. Samples at locations upstream and downstream of the dam will be drawn for testing	- Environment Specialist	- Project Director	Suggested in Table 12

Environmental Concerns	Mitigation Measures	Implementation	Supervision	Cost
Use of irrigation water for cultivating high delta crops	- Cultivation of high delta crops will be strictly discouraged. Cropping pattern in accordance with the water balance model will be suggested and promoted.	- FATA Agriculture Department	- Project Director	Suggested in Table 12
Surface water contamination due to washing etc.	- Contractor will demarcate a washing area for all sorts of washing activities, with running water facility connected to a dedicated drain flowing into the septic tanks	- Contractor	- Construction Engineer	Included in project costs
Drinking water	- Contractor will get stream water tested for chemical and biological contaminants, and assist in providing filtration to make water drinkable.	- Contractor	- Environment Specialist	Suggested in Table 12
Municipal liquid and solid waste	- Contractor will ensure solid waste bins are placed at labor eating and resting areas. Latrines and washing areas with septic tanks will be erected by the contractor at the construction site.	- Contractor	- Construction Engineer	Included in project costs
Air Quality and Noise Pollution				

Environmental Concerns	Mitigation Measures	Implementation	Supervision	Cost
Noise Pollution due to use of old machinery	- The contractor will ensure use of newer, well maintained machinery that creates minimum noise and emissions as per NEQS 2000. - Vehicles used will be regularly checked for engine and exhaust noise. - Night time construction activities will be discouraged strictly, especially no blasting will take place after sunset. - Noise monitoring will be carried out near sensitive receptors on a monthly basis. The NEQS for noise residential areas is 55 dB(A) in the day time and 45 dB(A) at night. It is recommended that noise levels close to sensitive receptors do not exceed 55 dB(A) during the day time as required by the NEQS.	- Contractor	- Construction Engineer	Suggested in Table 12
Dust from construction and smoke from plants and machinery	- Contractor will use water sprinkling to minimize dust. - The contractor will make best efforts to provide well maintained machinery in a workable condition and emits least possible emissions - Vehicles will be regularly tuned, and checked for vehicular emissions to reduce air pollution	- Contractor	Construction Engineer	No additional costs

Environmental Concerns	Mitigation Measures	Implementation	Supervision	Cost
Smoke from burning of waste or firewood	- Contractor shall strictly ban burning of waste or of wood, especially extracted from nearby shrubs and bushes. He must provide clean fuel to the labor to use for their daily purposes	- Contractor	Construction Engineer	No additional costs
Biological Resources				
Damage to flora, fauna and habitat	- Contractor will ban extraction from the surrounding vegetation for fuelwood (or any other purpose), hunting of any birds/mammals/fish by the labor employed. - If such a case is witnessed, it will be brought to the notice of the project management as well as the concerned APA	- Contractor - Environment Specialist - APA	Project Director	
Socioeconomic and Cultural Issues				
Tribal tensions and rivalries	- Ensure continuous liaison with the communities throughout the construction of the project, so as to identify any such incident in time. - Relevant political authorities will be kept abreast of the progress, as well as any such issue if in making.	- Social Development Specialist	Project Director	No additional costs

Environmental Concerns	Mitigation Measures	Implementation	Supervision	Cost
Community safety risks due to both accidental and natural hazards	- Dam site will be located away from any settlement, or any public place where communities visit (graveyards, shrines, schools, etc.) - Public access to the site will be strictly prohibited, and a periphery fence will be erected. - Construction Camp Site will have first aid facility, with certain staff trained to handle emergencies. - Emergency Response Plan prepared and in place	- Contractor	- Social Development Specialist - Project Director	No additional costs
HSE protocols for labor	- Labour will be provided with protective gear including safety equipment, such as helmets, jackets, boots, torches, etc - Fire safety plans will also be prepared and drills carried out	- Contractor	- Construction Engineer	Suggested in Table 12

c. Environment Monitoring Plan

151. The overall responsibility for the environmental monitoring of the project lies with the EA. Environmental performance of the project will be monitored by the EMU, assisted by the Construction Supervision Engineer. The results will be communicated to ADB through bi-annual environmental monitoring reports prepared on ADB prescribed template. Indicators for the internal monitoring will be those related to process and immediate outputs and results. This information will be collected directly in the field by EMU, and reported monthly to the Project Director to assess the environmental compliance.

152. Specific monitoring benchmarks will be:

(i) Contractor(s) compliance with EMP;
(ii) Complaints received and addressed by the Grievance Committee;
(iii) Environmental impacts other than perceived.

153. Monitoring activities during implementation will focus on recording implementation of mitigation measures (as per EMP), recording environmental parameters, reviewing contractor environmental performance and proposing remedial actions to address unexpected impacts during construction.

154. During the design phase, the monitoring activities will focus on

(i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included;
(ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment.

155. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, recording the project's environmental achievements and to guide any remedial action to address unexpected impacts.

Table 10 Environmental Monitoring Plan for JKDIP

	Monitoring Task	**Responsibility**	**Timeline**
1.	**Design phase**		
1.1	IEE submitted to Federal EPA and NOC obtained	Environment Specialist	Prior to initiation of construction and issuance of bidding documents
1.2	Review bidding documents to ensure EMP is included	Environment Specialist	Prior to issuance of bidding documents
1.3	Training on EMP imparted to project staff	Environment Specialist and EMU	Prior to initiation of construction
2.	**Construction Phase**		

2.1	Monthly monitoring and bi-annual reporting of contractor's compliance with environment mitigation measures	Environment Specialist	Throughout construction
2.2	Monthly monitoring and bi-annual reporting of contractual obligations with regards to EMP	Environment Specialist	Throughout construction
2.3	Monthly monitoring and bi-annual reporting of all grievances related to environment issues	Environment Specialist	Throughout construction
2.4	Monthly monitoring and bi-annual reporting of all tasks assigned as per EMP	Environment Specialist	Throughout construction
2.5	Quarterly review of EMP to make any adjustments	Environment Specialist	Throughout construction
1.	**Operations and Maintenance**		
3.1	Observations during routine maintenance inspections of facilities. Inspections will include monitoring implementation of operational mitigation measures as specified in EMP for operational impacts	Environment Specialist	As per inspection workplan

d. Trainings and capacity enhancement

156. Various types of trainings have been suggested in the EMP for construction phase as well as post construction. The target audience for these trainings also varies from the project staff, contractor's staff and communities at large. Table 10 describes the details:

Table 11 Capacity Enhancement Program

	Training Session	Learning Objectives	Target Groups
1.	Fuel and Oil Spillage	To learn about optimum methods of fuel filling and storage	Contractor(s)
2.	Health, Safety and Environment	Understanding HSE requirements and protocols,	Contractor(s), related project staff
3.	Better Management Practices (BMP) in Agriculture	Improved methods of fertilizer and pesticide use, including on farm water management	Farmer communities
4.	EMP implementation	Understanding of implementation requirements and roles and responsibilities	Project Staff, contractors

Table 12 Estimated Costs associated with ESMP Implementation

Item	Sub Item	Costs in PKR (million)
Staffing	2 persons for 12 months each @ PKR 100,000	2.4
Monitoring Activities	Water sampling and testing: 12 samples (one per month) @ PKR 6000 each Drinking water sampling and testing: 4 samples @ PKR 2000 each Noise/sound monitor for monthly noise monitoring: PKR 100,000	0.2
Training program (inclusive of modules development, resource persons, refreshers)	Fuel and oil spill: PKR 500,000 HSE: PKR 500,000 BMP in Agriculture: PKR 20,00,000	3
Contingency (@ 10%)		0.6
	Total Costs	**6.2**

I. Conclusion and Recommendation

157. Environmental impacts of JKDIP will not be significant enough to cause any irreversible damages to the ecology of the area. There are potential impacts that have the risk to alter the conditions in the medium to longer term, but this IEE attempts to suggest mitigation measures that would help minimize such impacts.

158. In order to ensure that the impacts remain minimal, EMP compliance monitoring will be critical. As suggested, dedicated staff must be brought on board as soon as the mobilization for project implementation initiates. EMU must be set up with the first of project mobilization, so that the specialists can start liaison with the Fed EPA as well as initiate vetting the contractual bids. Also, the trainings need to be imparted within the second month as soon as the project staff is hired, especially the technical staff who will supervise the construction phase, as well as the contractors. Second round of consultations with the relevant stakeholders including communities, will also need to be taken up as soon as the EMU is set up.

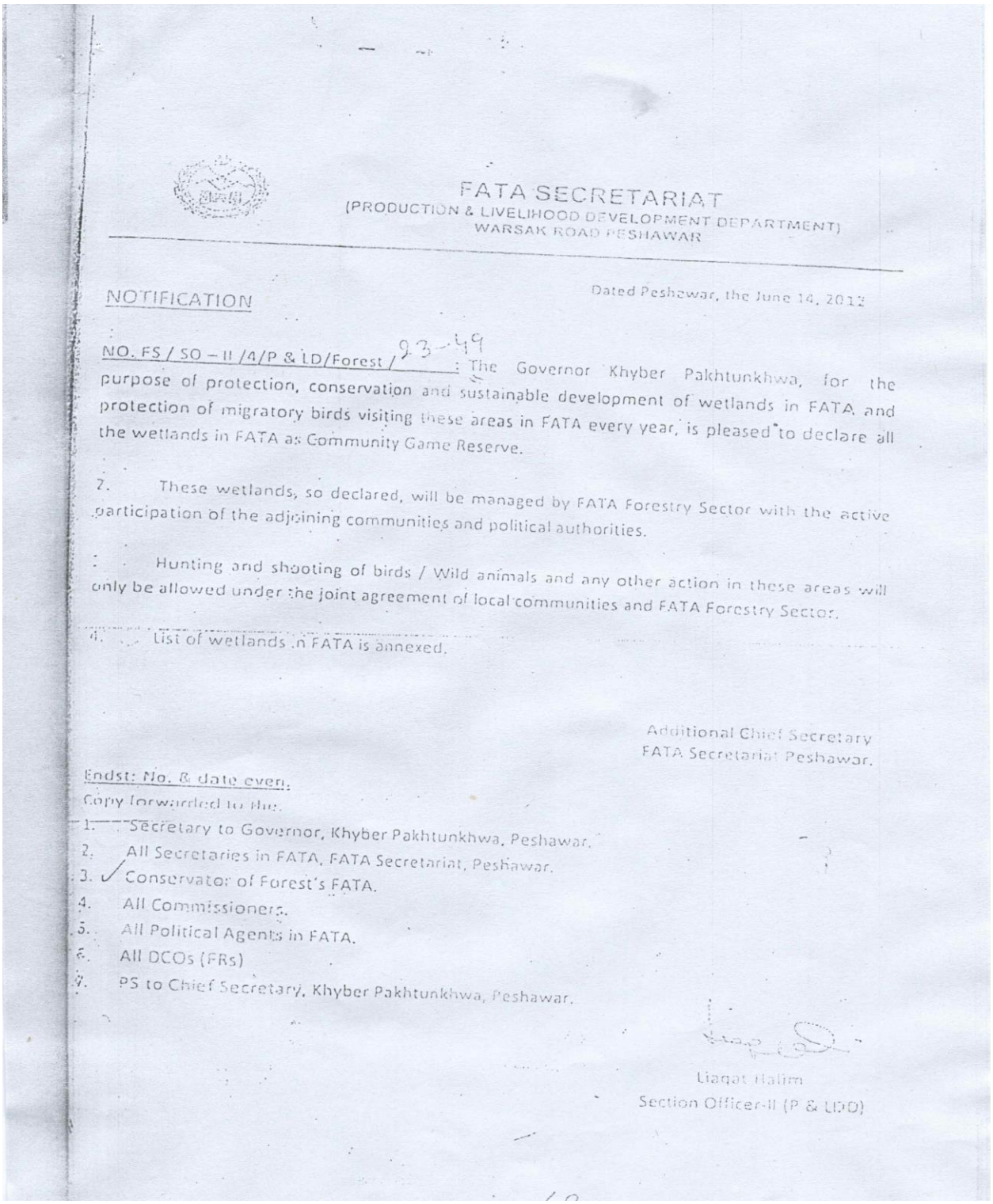
159. During the construction phase, review meetings with contractor staff, project team and EMU need to be a permanent feature, happening at least on a monthly basis. These

meetings should ideally be facilitated by the Environment Specialist, whereby all responsible staff should be present and provide feedback on the progress achieved as per EMP.

160. In conclusion, with the EMP being implemented to its letter and spirit, potential harmful impacts of the project will be minimized.

J. Annexures

Annexure 1 - Governor KPK Notification 1



FATA SECRETARIAT
(PRODUCTION & LIVELIHOOD DEVELOPMENT DEPARTMENT)
WARSAK ROAD PESHAWAR

NOTIFICATION

Dated Peshawar, the June 14, 2012

NO. FS / SO – II /4/P & LD/Forest / 9349 : The Governor Khyber Pakhtunkhwa, for the purpose of protection, conservation and sustainable development of wetlands in FATA and protection of migratory birds visiting these areas in FATA every year, is pleased to declare all the wetlands in FATA as Community Game Reserve.

2. These wetlands, so declared, will be managed by FATA Forestry Sector with the active participation of the adjoining communities and political authorities.

3. Hunting and shooting of birds / Wild animals and any other action in these areas will only be allowed under the joint agreement of local communities and FATA Forestry Sector.

4. List of wetlands in FATA is annexed.

Additional Chief Secretary
FATA Secretariat Peshawar.

Endst: No. & date even.

Copy forwarded to the:

1. Secretary to Governor, Khyber Pakhtunkhwa, Peshawar.
2. All Secretaries in FATA, FATA Secretariat, Peshawar.
3. Conservator of Forest's FATA.
4. All Commissioners.
5. All Political Agents in FATA.
6. All DCOs (FRs)
7. PS to Chief Secretary, Khyber Pakhtunkhwa, Peshawar.

Liaqat Halim
Section Officer-II (P & LDD)

Annexure: Common Wetlands of FATA

S.No	Name of River	Agency/FR
1.	Bajaur Khwar, Charmang	Bajaur
2.	Bara Khwar	Khyber
3.	Tochi	North Waziristan
4.	Kurram	Kurram
5.	Gomal Zam, Wana, Dara, Chagmalai, Tank Zam	South Waziristan
6.	Daraban Zam, Chaudwan Zam	FR D.I.Khan
7.	River Swat	Bajaur and Mohmand
8.	River Kabul	Khyber and Mohmand

Supplementary wetland of FATA

S.No	Name of River	Agency/FR
1.	Mir Kalam Dam	North Waziristan Agency
2.	Dargai Pal Dam	South Waziristan Agency
3.	Baran Dam	F.R. Bannu
4.	Warsak Dam	Mohmand Agency
5.	Spera Dam (Bara)	Khyber Agency
6.	Mandooni Dam	Kurram Agency
7.	Kot Ragha Dam	Kurram Agency
8.	Talai Dam	Bajaur Agency
9.	Raghan Dam	Bajaur Agency
10.	Mandal Dam	Bajaur Agency

Annexure 2 - Governor KPK Notification 2

FATA SECRETARIAT
(PRODUCTION & LIVELIHOOD DEVELOPMENT DEPARTMENT)
WARSAK ROAD PESHAWAR

NOTIFICATION

Dated Peshawar, the June 14, 2012

NO. FS / SO – II /4/P & LD/Forest /50-76: The Governor Khyber Pakhtunkhwa, to protect all kinds of wild fauna (wild animals & birds) in FATA is pleased to order a ban on sale / trade of all kinds of wild fauna including the migratory birds, alive or their stuffed body parts (skin, trophies and other related items).

2. Offenders will be dealt under the amended law of FCR by FATA Forestry Sector and Political Authorities till such time specific regulations notified.

3. List of species of wild Fauna is annexed.

Additional Chief Secretary
FATA Secretariat Peshawar.

Endst: No. & date even.

Copy forwarded to the:

1. Secretary to Governor, Khyber Pakhtunkhwa, Peshawar.
2. All Secretaries in FATA, FATA Secretariat, Peshawar.
3. Conservator of Forest's FATA.
4. All Commissioners.
5. All Political Agents in FATA.
6. All DCOs (FRs)
7. PS to Chief Secretary, Khyber Pakhtunkhwa, Peshawar.
8. PS to Additional Chief Secretary FATA Secretariat.

Liaquat Halim
Section Officer-II (P & LDD)

Annexure: List of species of Wild Fauna protected through this Notification

Wild Ungulates

Himalayan lynx, Afghan urial, Suleman markhor, Himalayan ibex, Musk deer, Barking deer, Chinkara deer.

Pheasants

Monal pheasant, Koklass pheasant, Kalij pheasant, Himalayan snow cock.

Partridges

Grey partridge, Black partridge, See See partridge, Chakoor partridge and Snow partridge.

Birds

Blue tailed Bee eater, Little brown Dove, Indian Pipit, Common babbler, Yellow headed Wagtail, Red billed blue Magpie, Indian Roller, Small Skylark, Blue Rock, Pigeon, Brahminy Kite, Large pied Wagtail, Collared Dove, Golden backed Wood Pecker, White Wagtail, Spotted Dove etc.

Migratory Birds

Cranes, Houbara bustard, Falcons, Eagles, Sandgrouse, greylag geese, bare headed geese, Quails and all species of ducks.

Waterfowl

Great egret, Purple moorhen, Common moorhen, Nigth heron, Little ringed Plover, Little egret, Indian shag, Red wattled Lapwing, Great crested grebe, Pheasant tailed Jacana, Spoonbill, Curlew, Coot, Cattle egret, Eastern grey heron, Common snipe, Common sandpiper, cormorant, Great sand plover and Black winged stilt.

Large predatory/ other Mammals

Snow leopard, Common leopard, Leopard cat, bear and monkeys.

K. Figures

Figure 1 River System of Mohmand Agency & Location of Jay Dam

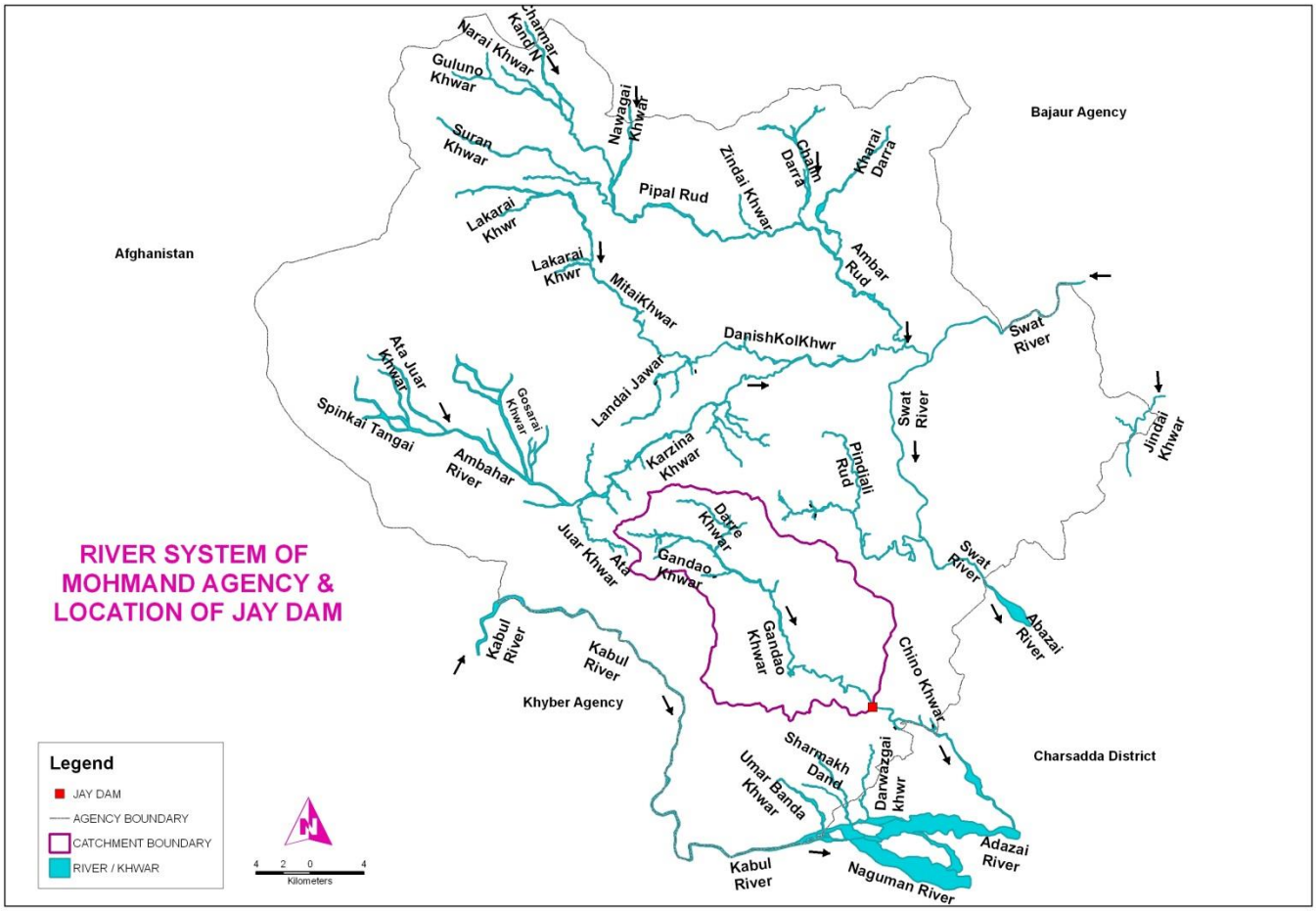


Figure 2 Catchment and Command Area of Jay Dam

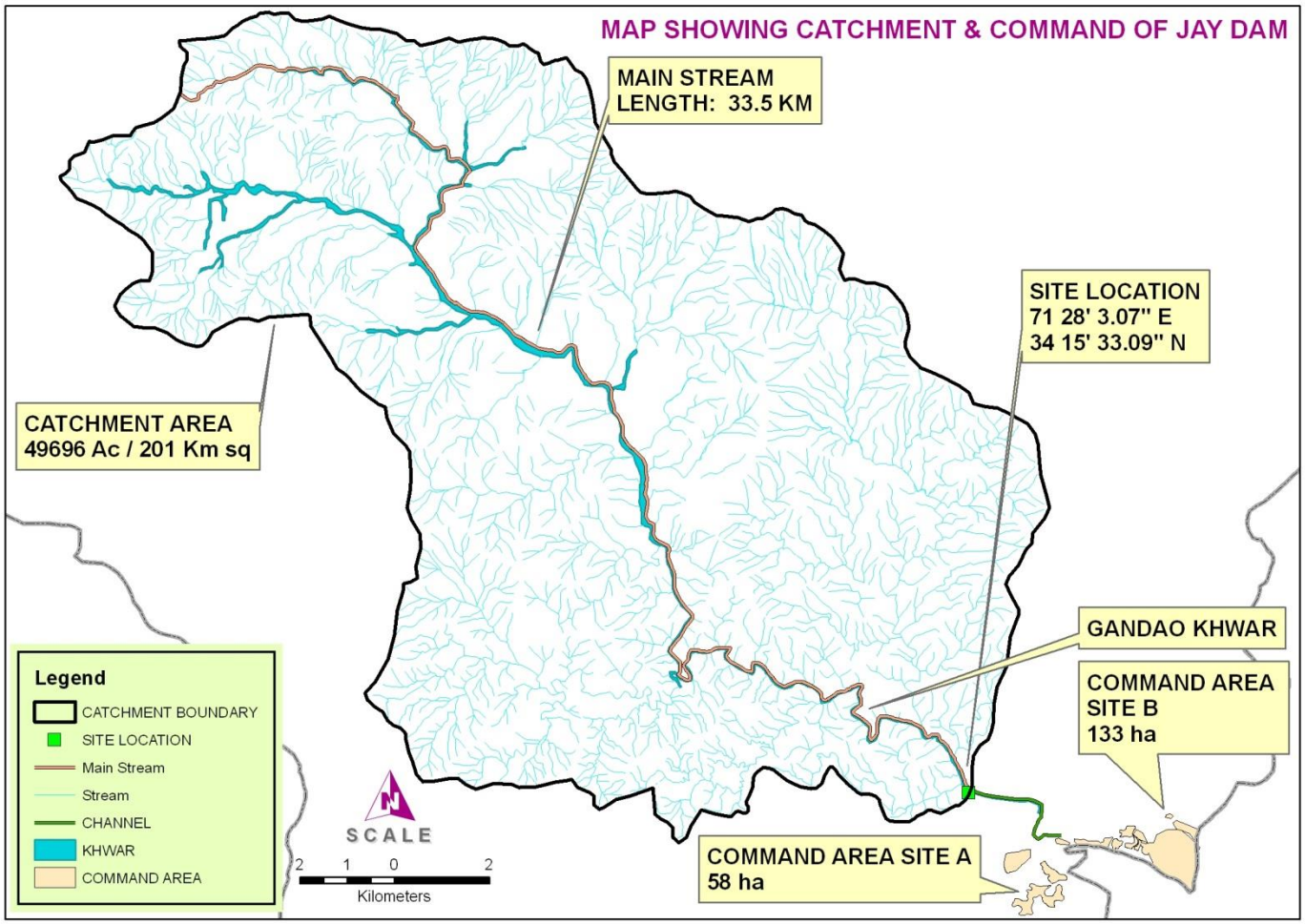
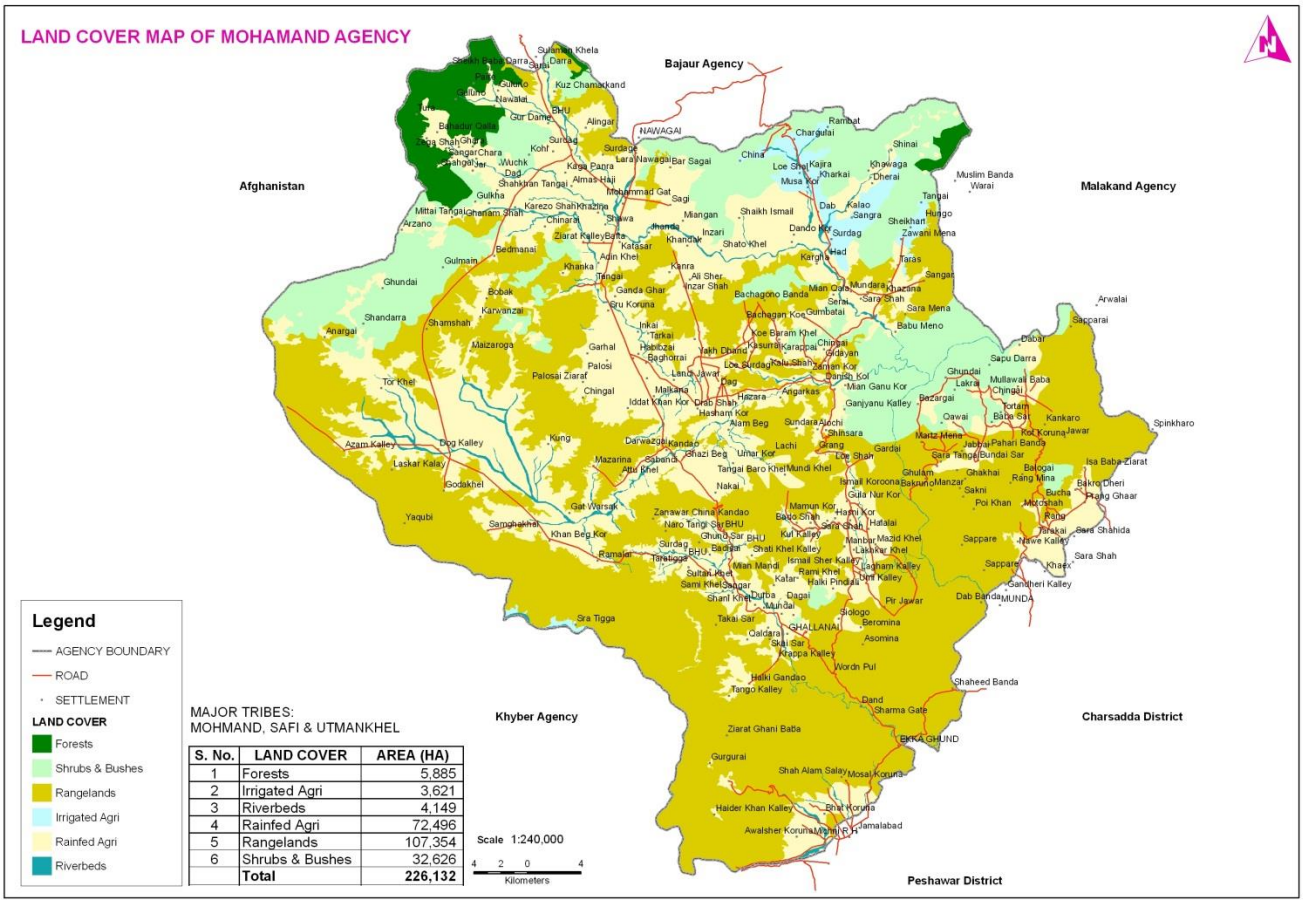


Figure 3 Land Cover Map of Mohmand Agency



S. No.	LAND COVER	AREA (HA)
1	Forests	5,885
2	Irrigated Agri	3,621
3	Riverbeds	4,149
4	Rainfed Agri	72,496
5	Rangelands	107,354
6	Shrubs & Bushes	32,626
	Total	**226,132**

Figure 4 Tectonic Map of Pakistan Showing Jay Dam

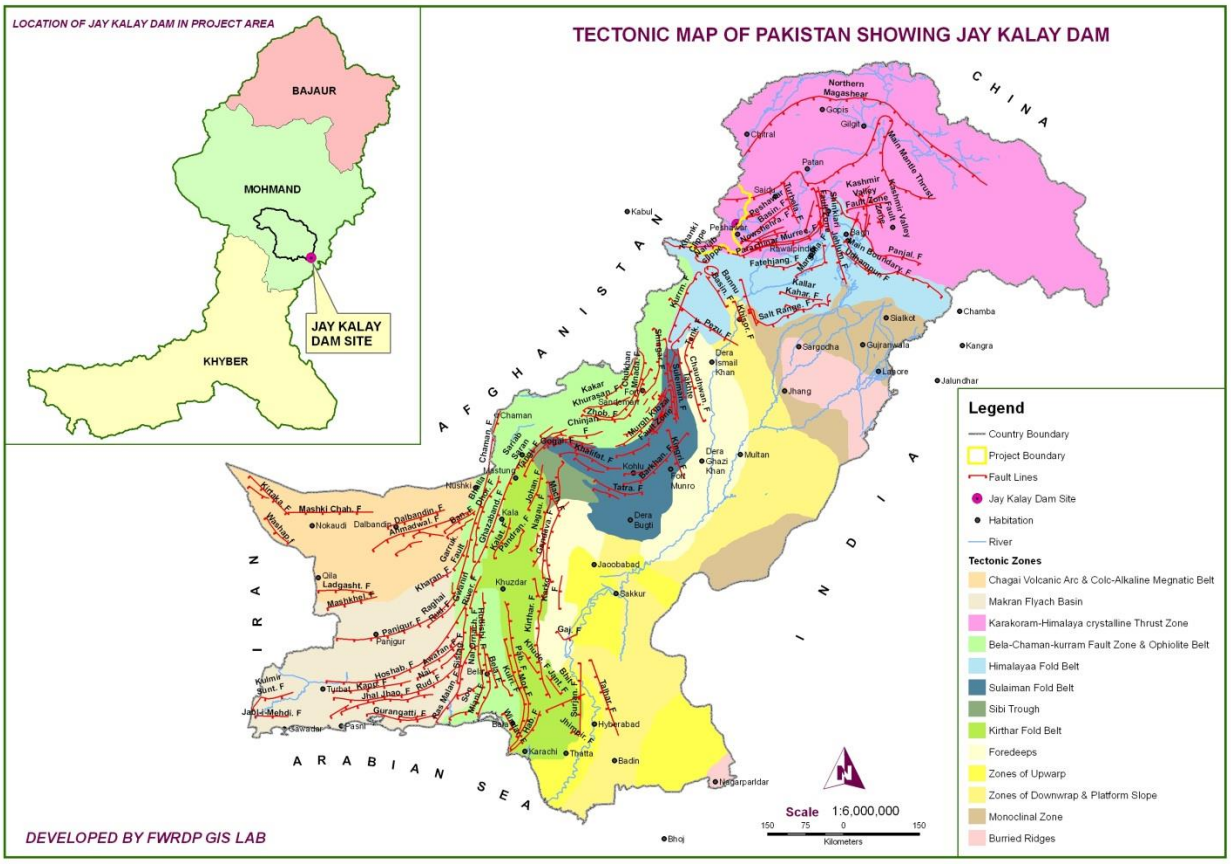


Figure 5 Soil Classification Map of FATA

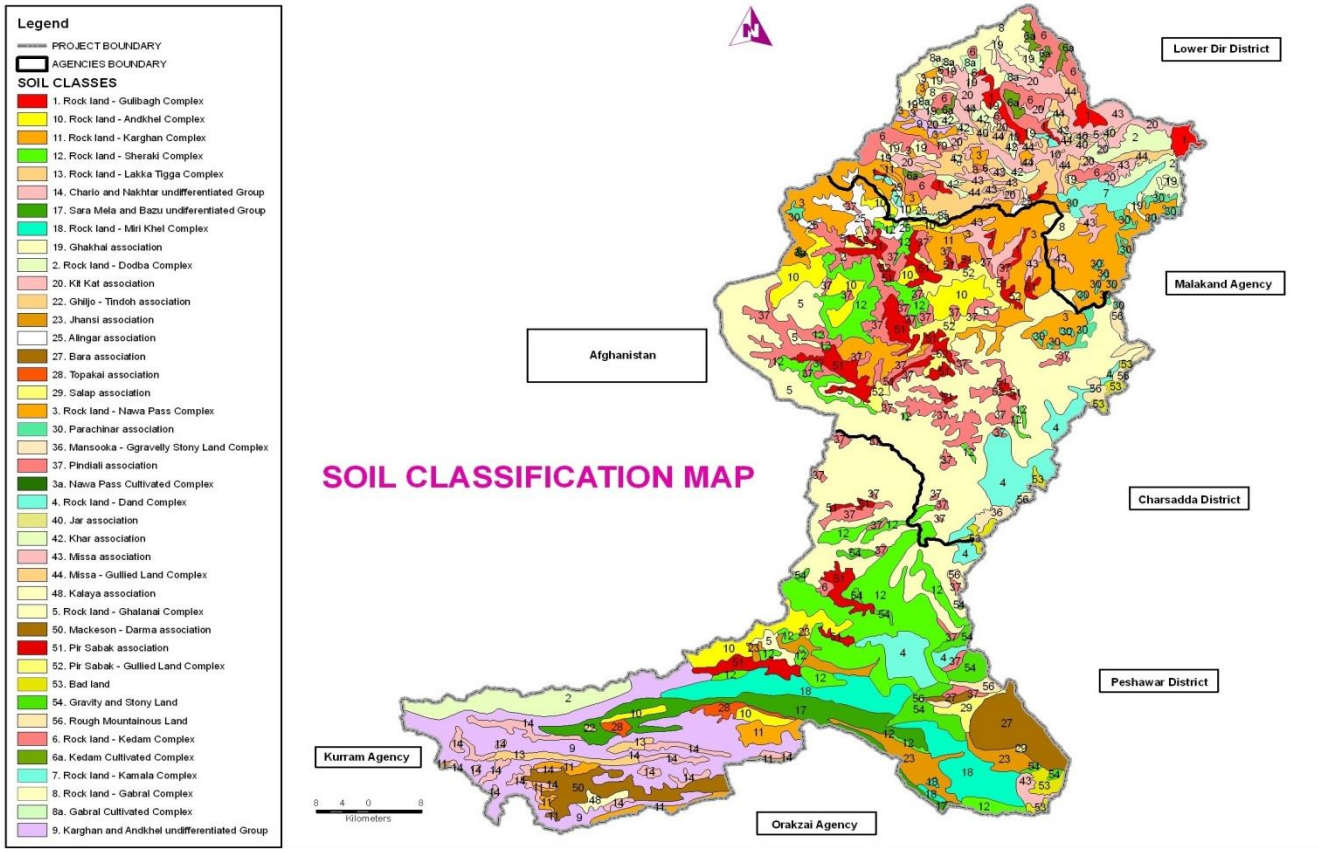


Figure 6 Seismic Hazard Zones of Pakistan

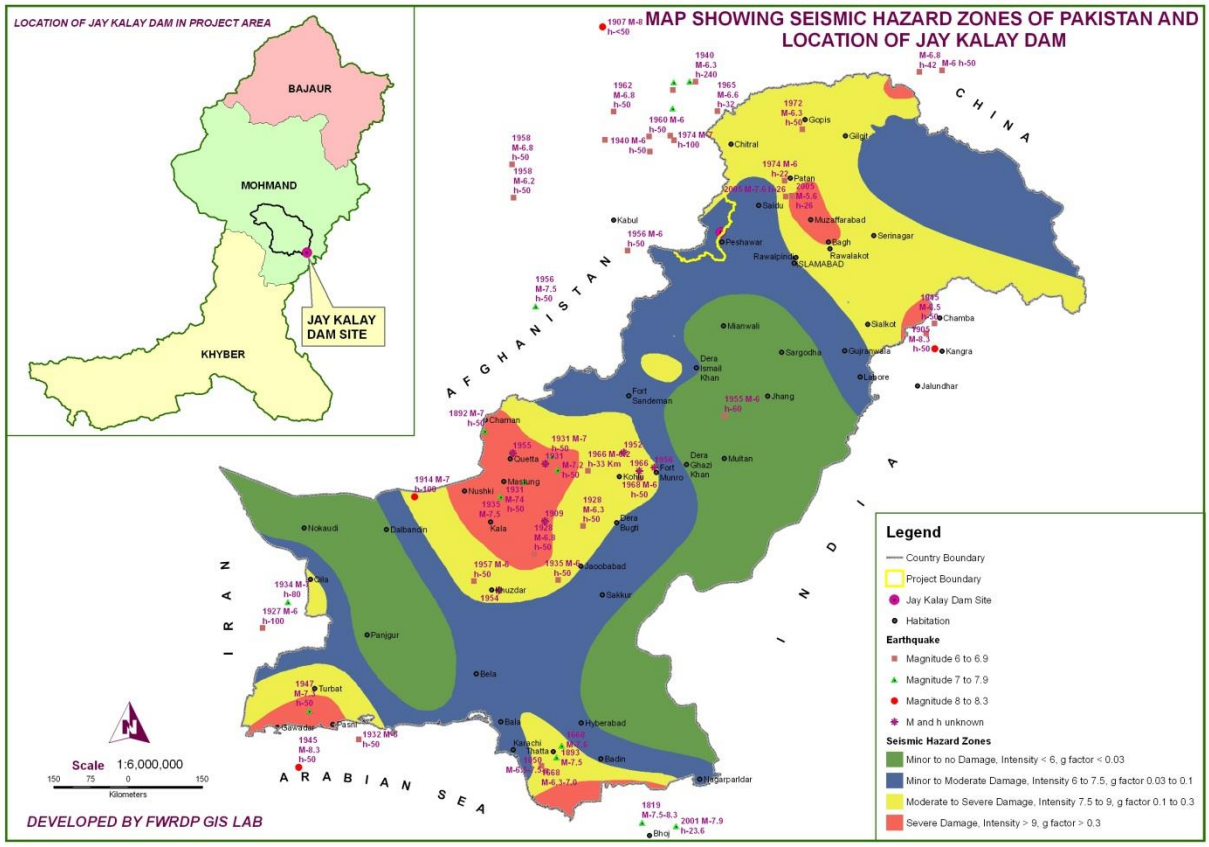


Figure 7 Land Cover Map of Jay Dam

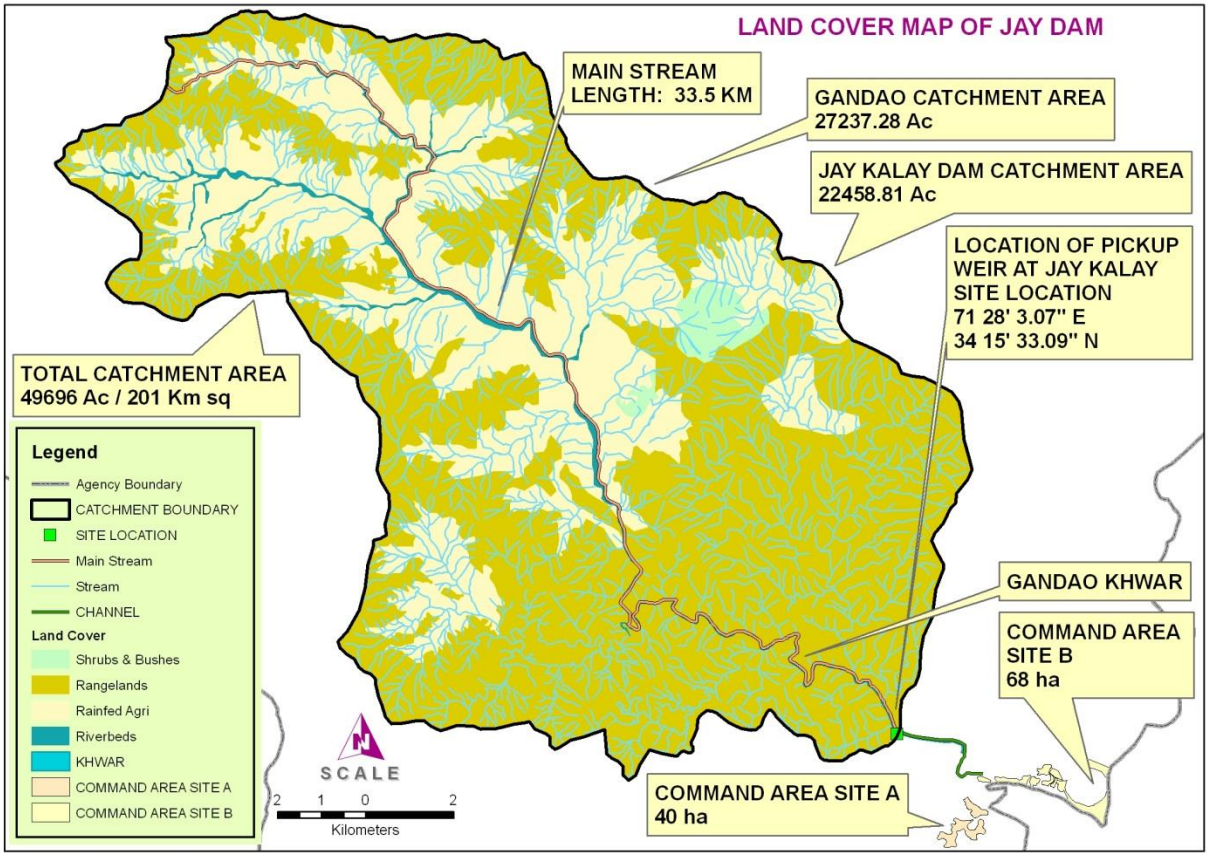


Figure 8 Cropping Calendar for Mohmand

Cropping Calendar in the Project Area Mohmand Agency												
Crops	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wheat	Fertigation-irrigation		early harvesting -Harvesting					Prep.land	sowing	sowing	L sowing	
Carrot								Prep.land	sowing	Management practices		
Peas	early harvesting -Harvesting								Prep.land	sowing	irrigation	MP
Turnip	early harvesting -Harvesting								Prep.land	sowing	MP	MP
Raddish	early harvesting -Harvesting								Prep. land	sowing	MP	MP
Tomato	early harvesting -Harvesting							Prep. land	sowing	MP	MP	MP
Onion								Prep. land	sowing	MP	MP	MP
Potato1	Prep. land	sowing	MP	MP								
Potato 2	MP	MP	Harvesting								Prep. land	sowing
Maize					Prep. land	sowing	MP	early harvesting -Harvesting				