Initial Environment Examination-Shangede 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.

Abbreviation

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
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
SDIP	Shangade Dam Irrigation Project
ToR	Terms Of Reference
WWF	World Wide Fund for Nature

Contents

EXECUTIVE SUMMARY

THE PROJECT

1. The proposed Shangade Dam Irrigation Project (SDIP) is located in Khyber Agency, a Federally Administered Tribal Area (FATA) in northwest Pakistan. The dam will be constructed on Lashora Khwar, a semi-perennial tertiary stream, which after draining into secondary and primary streams, eventually falls into Kabul River. The site is located 12 km North West of Jamrud Town (agency head quarter of Khyber Agency) near the village of Wula Mela. The coordinates of the proposed dam axis are 34° 4'36.68"N and 71°19'5.91"E.

2. Catchment area of the SDIP is 11.48 km^2, and the length of the main stream is about 6.20 km. The vegetative cover of the catchment is poor, while the stream/khwar bed is covered with overburden comprising of boulders, shingle, gravel and coarse sand. The settlements in the catchment area are scattered in small pockets.

PROJECT OBJECTIVES

3. The main objective of the SDIP is to develop flood runoff storage for assured irrigation supplies to Culturable Command Area (CCA) of approximately 171 ha 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 to recharging the groundwater table.

4. The main component of the sub-project consists of a plumb concrete gravity dam to store floodwater. The project also includes a component of watershed management to ensure continuous water quality and quantity, and to decrease the sedimentation load. The catchment area consists of 2 ha riverbed, 639 ha of shrubs and 490 ha rangeland/forest land. Forests and rangeland management activities, along with soil conservation works will be carried out upstream of the SDIP. 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 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.

CONSTRUCTION PLAN

5. The main components of Shangade 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.

6. 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. Further, 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)

7. SDIP 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)

8. 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

9. The studied area for this IEE was broadly the Khyber Agency, and more specifically sub-project location including Shangade settlement and the catchment of Lashora Khwar, stream on which SDIP is proposed to be constructed.

10. Total population of the Agency in 1998 was about 546,000 persons, out of which 52% was males and 48% female. The population has been estimated to have increased to about 1.0 million by 2013, with a growth rate of 3.92%. The population density is about 391 persons per km^2 while the male-female ratio is 1:1.09[1].

11. The project site is situated in the northwest of Jamrud tehsil having a population of approximately 3558 persons, and 391 households. Afridis are the main tribe and are further sub divided into Zakha Khel sub tribe.

[1] FWRDP Inception Report, Important Agnecy/FR wise Socioeconomic Indicators of FATA 2012

12. 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[2].
13. 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.
14. 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

15. Most of the environmental impacts of SDIP 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.
16. 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.
17. 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.
18. 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,

[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)

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.

19. 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.
20. Information disclosure will be ensured throughout the design, construction and completion phases, with a culturally suitable and effective grievance redress mechanism in place.
21. 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

22. Environmental impacts of SDIP 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.
23. 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.
24. 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, and all responsible staff should be present and provide feedback on the progress achieved as per EMP.
25. **In conclusion, with the EMP being implemented in its letter and spirit, potential harmful impacts of the project will be minimized.**

Environmental Assessment Report

FATA Water Resources Development Project

Shangade Irrigation Dam Project

A. Introduction

26. 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.

27. 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.

28. 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 Shangade Dam Irrigation Project (SDIP), a sub project proposed for Khyber Agency. SDIP is one of the three sub-projects currently being proposed for inclusion in FWRDP.

B. Assessment of Legal and Policy Frameworks

1. Asian Development Bank (ADB)

29. SDIP 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)

30. 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 SDIP 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 SDIP in accordance to PEPA 1997

Criteria for conducting an IEE by PEPA 1997, Schedule I	Shangade 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

31. The proposed SDIP is located on Lashora 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 located12 km North West of Jamrud Town (agency head quarter of Khyber Agency) near the village of Wula Mela. The coordinates of proposed dam axis are 34° 4'36.68"N and 71°19'5.91"E, as shown in Figure 2.
32. Catchment area of the SDIP is 11.48 km^2 (4.432 sq miles).The length of main stream is about 6.20 km (3.85 miles) with a bed slope of 109.18 m per km (2.83 %). There is no perennial flow upstream of dam site, whereas perennial flow in the downstream of dam site has been monitored for 3 months, and average flow of 4.7 cusec is taken as per observation and locals interviews. The inflow into the reservoir is based on runoff generated due to rainfall. The catchment area has moderate to steep gradient with highest levels of 1354.53 m (4444 ft) AMSL, extracted from digital elevation model, while elevation at proposed dam site is 663.8 m (2177.8 ft). The vegetative cover of the catchment is poor, while the stream/khwar bed is covered with overburden comprising of boulders, shingle, gravel and coarse sand. The settlements in the catchment area are scattered in small pockets.

2. Project Objectives

33. The main objective of the SDIP is to develop flood runoff storage for assured irrigation supplies to Culturable Command Area (CCA) of approximately 171 ha, 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.

34. The main component of the sub-project will consist of a plumb concrete gravity dam to store the flood water. 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. In addition to the above, a component of watershed management will also be executed, in order to stabilize the slopes and control the sedimentation load. The Catchment area of Shangade Dam has been classified as semi-arid sub-tropical on the basis of the finding of ground and surface water studies under FRDP Water Assessment Study. The catchment area consists of 2 ha riverbed, 639 ha of shrubs and 490 ha rangeland/forest land. Forests and rangeland management activities, along with soil conservation works will be carried out upstream the SDIP. 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.

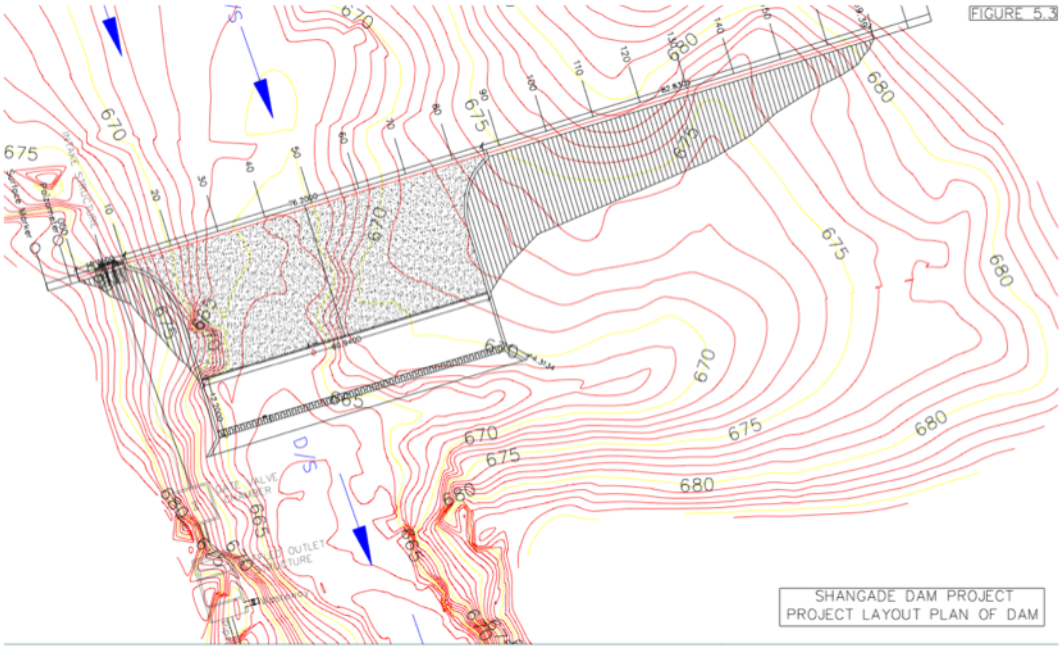


Diagram 1: Layout Plan of Shangade Dam

3. Construction Plan

35. The main components of Shangade 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.

36. 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

37. 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

38. On the basis of Geotechnical investigations double grout curtain will be suggested/revised. Surface treatment of rock and completion of grout curtain at the Shangade 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

39. 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

40. Construction of main dam embankment is proposed to commence from right abutment towards the left abutment in layers and intake pipe would be placed near right 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

41. 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.677.617 m with chute channel having (1.73:1,H:V) slope and ending with a USBR type-III stilling basin.

iii. Irrigation System

42. 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 Shangade dam. The activity would be mostly carried out by the beneficiaries as part of their Labour and Land contribution

c. Commissioning of Dam

43. 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

44. The studied area for this IEE was broadly the Khyber Agency, and more specifically sub-project location including Shangade settlement and the catchment of the Lashora Khwar, stream on which SDIP is proposed to be constructed.
45. 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. Species Distribution Maps prepared by WWF Pakistan
    iv. GIS Database developed by the PPTA GIS Specialist
    v. Primary Surveys conducted under PPTA by Environment Specialist
    vi. Hydraulic Design Feasibilities conducted under PPTA by Hydraulic Design Specialist
    vii. Agriculture and Geological Studies conducted under PPTA by Agricultural Specialist and Geologist
    viii. Social Assessment Studies conducted under PPTA by the Social Safeguards Specialist
    ix. Meetings with FATA Chief Economist, Forestry Unit, Fisheries Department, Monitoring & Evaluation Department, KPK Wildlife Department, Inspector General of Forests, Pakistan, and Director General Pak EPA

46. 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 Plan3.

47. 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 basichazard mapping exercise.
48. 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.

a. Topography of the Area

49. Khyber Agency covers an area of 2,556 km^2 and is located between latitude 34^o 45' and 34^o-20'North and longitude 70^o 26' and 71^o 32'E. The area drains into Kabul River in the north and Bara River towards south. The area is mountainous, with a series of Hindukush off-shoots, such as Lacha Ghar, Karagah Ghar, Surghar and Torgah. Tirah and Loe Shilman are the prominent valleys of the Agency. Most of these ranges are barren, with elevation ranging between 461 to 1100 m.

2. Physical Resources

a. Atmosphere

i. Climate

50. Khyber Agency has severe weather i.e. very cold in winters and very hot in summers. December and January are the coldest months of the year. The summer temperatures range from 23^oC to 45^oC and average annual rainfall is about 519 mm.
51. The climate of the project area varies from semi-arid to sub-humid sub-tropical temperate. Physiographic features, especially altitudes have major impact on local climatic conditions. This is well depicted by the soils and vegetation of the area.
52. 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

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

the available climatic data and altitudinal considerations, the project area is classified as semi-arid sub-tropical zone. 11 watersheds of Khyber Agency fall into this climatic zone, including Kuki Khel, which is the watershed of the SDIP. Average annual rainfall in Kuki Khel is recorded as 381 mm. Winter rains are more frequent with lesser intensity and longer duration. Mean annual temperature ranges between 18^0Cand 23^0C, mean winter temperature ranges between 8^0C and 12^0C and mean summer temperature ranges between 29^oC and 32^oC. June and July are the hottest months with mean maximum temperature ranging between 35^oC and 40^oC. December and January are the coldest months with mean minimum temperatures from 5^oC to 1.5^oC.

ii. Recent Droughts

53. 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

54. 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[4].

b. Geology

i. Regional Geology

55. Figure 4 shows the tectonic map of the area. The Geological formation in the region related to the project area is composed of sedimentary and metamorphic rocks of Silurian-Devonian Age. Khyber Agency consists largely of Paleozoic Rock which consists of the following rock formations:

    (i) Jafar Kandao formation: Argillite, limestone, argillaceous and calcareous quartzite.

[4] There is no Environmental Protection Agency (EPA) in FATA, and neither did the IEE Team have 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.

(ii) Lowara Mena formation: Phyllite and phyllitic slate with beds of fossiliferous limestone, carbonaceous shale and dolorite dykes.

(iii) Warsak Metamorphic complex: Quartz mica schist, garnet mica schist, amphibolites schist with hydrothermal quartz veins.

(iv) Nowshera formation: Pinkish gray tin to medium bedded limestone, dolomite and carbonate cemented sandstone and quartzite.

(v) Ghnadai Sar formation: Marble, dolomite, quartzite, phyllite, slate and fossiliferous limestone.

(vi) Panjpair formation: Dark gray argillite and phyllite with lenses and inter-beds of crinoidal limestone and quartzite.

(vii) Misri Banda Quartzite: Pinkish gray feldspathic quartzite with subordinate argillite.

(viii) Ambar formation: Gray, cherty dolomite, inter-bedded limestone. Overlain by maroon colored thinly laminated argillite.

(ix) Inzari Limestone: Light yellowish gray limestone traversed by stylolitic filling in the upper part.

(x) Hisartang formation: White to light gray quartzite in lower and upper parts, argillite in the middle part.

(xi) Darawaza formation: Dark gray argillite, quartzose sandstone with subordinate limestone.

ii. Dam Site Geology

56. Main rocks of the project area are metamorphic rocks such as mica schist and some meta-sedimentary rocks, such as metamorphosed limestone, extending from north towards south. Both formations are inter-bedded. The geological map of the dam site was proposed with the help of quadrangle geological map of Geological Survey of Pakistan and resistivity survey conducted at site. On the basis of these investigations the geological condition of dam is inferred.

iii. Reservoir

57. 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, and impermeable. Sufficient water could be stored even at low height of the dam.

58. Mica schist is mainly exposed on both abutments of dam site. The rock is gray to dark gray, medium grains, schistose character, very closely jointed and low, medium to high in

strength. On weathered surface it is brownish gray, while on fresh surface it is gray. Two meters over burden is present at both abutments. Small scale folds and faults are present. A large number of quartz veins are present along the weaker plains. Quartz veins are from few mm to many cm.

59. Same type of rock body (mica schist) is exposed on stream bed. It has same petro physical properties. According to the electrical resistivity survey conducted, the subsurface lithology of the project site is mostly composed of sandy clay, sand and gravel, boulders overlying on bed rock.

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 load as well as 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.
61. The soil of the dam site and command area in Shangade is piedmont plain, coarse to medium in texture, and light dark in color. The profile depth is shallow and mostly immature soil development, gently to moderate sloping and well drained. The limitations of the area are irregular topography, rocky land, rapid permeability, erosion hazards and topographic conditions.

d. Seismicity/ Earth Quake Hazard

62. 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 Shangade, also confirmed occurrence of minor earthquakes.

e. Surface Water

63. 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 Khyber Agency (as shown in Figure 1) that have perennial flow from snow melt.

64. The following major rivers flow through the project area of Khyber agency:

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

65. 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%[5]. 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.
66. 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
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

Bara River (Khyber Agency)

67. Bara River originates in the southeast of Khyber Agency from Rajgah and Malik Din Khel watersheds. It drains into the Kabul River near Nissata, after passing through the settled

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

areas. There are three canals off-taking from the river, within and outside Khyber Agency. The details are given as under:

Table 3 Irrigation Canals on Bara River

S.No	Description	Discharge (cusecs)	Length (m)	CCA (ha)
1.	Sangu Branch in KPK	10	1225	548
2.	Shekhan Branch in KPK	16	1541	1218
3.	Bara River Canal in Khyber Agency	279	2680	18219

68. There are 14 watersheds in Khyber Agency, 11 of which fall into the semi-arid sub-tropical climatic zone, while 3 fall into the sub-humid sub-tropical zone. Total surface water available in the Agency for a given average year is approximately 802.5 MCM, where 385.3 MCM is already being utilized for irrigation purposes while approximately 417 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 4 Watershed Details

S. No	Watershed	Confining Coordinates		Area of Watershed (km^2)
		Longitude(E) Degree	Latitude(N) Degree	
1.	Spinpokh-Shamsai	71.12-71.30	34.08-34.14	96.80
2.	Jamrud	71.20-71.44	34.02-34.10	166.42
3.	Bazar Valley (ZakhaKhel)	70.90-71.25	34.04-34.17	301.13
4.	Bara	71.20-71.54	34.04-34.12	478.05
5.	Mulagori	71.23-71.41	33.90-34.07	75.20
6.	Shilman	71.12-71.31	33.84-33.99	204.28
7.	Shpora	71.17-71.29	33.84-33.96	62.31
8.	Landi Kotal	71.07-71.22	33.76-33.84	108.02
9.	Zakha Khel	70.77-71.22	33.74-33.99	348.10
10.	Malik Din Khel	70.44-70.95	34.11-34.29	384.44
11.	Rajgah	70.51-70.82	34.09-34.18	270.72
12.	Murda Dand	71.31-71.38	33.75-33.96	30.34
13.	Kuki Khel	71.27-71.39	33.93-34.05	56.38
14.	Miri Khel	70.84-70.99	33.76-33.84	66.58

69. Khyber Agency is drained mostly by the Bara River, which originates from Tirah Valley and culminates into Kabul River south of Peshawar city. The high flow months are of April and May while January records minimum flows. Chora and Khyber streams drain Zakha Khel area and Khyber Pass. Lashora drains Kuki Khel watershed and has perennial flows ranging from 0.25 cusecs to 1.0 cusecs. The major streams draining the Khyber Agency are Nakai, Bazar, Aladand, Khangai, KamShilmen, Lashira, Malal, Ghalanai, Chora, Khyber and Bara and Kabul rivers.
70. Lashora Khwar/stream, where SDIP will be constructed, falls within the Kuki Khel watershed.

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. Khyber has a carboniferous formation, slate phyllites and schist with minor limestone and quartzite beds. The Agency is mountainous with no well-developed alluvial plains.
72. Groundwater is usually found at a depth of 55 - 70 meters, where annual recharge is 85.41 MCM for an average year, 46.18 for a dry year and 146.06 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. It can be observed that there is no forest cover in the area, rather there are rangelands.

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 & %)

Dry Temperate	Sub Tropical Broad Leaves	Tropical Thorn	Plantations	Total (Ha)
46379 (91.5)	1243 (2.4)	1408 (2.8)	1660 (3.3)	50690 (100)

76. Vegetation in the Agency reflects its climatic classification that is semi-arid, sub humid subtropical temperate. Maximum tree types are sub-tropical broad leaves, and shrubs and bushes. Major species of trees are *Phulai*, *Sanatha*, *Keekar* and *Gurgura*.

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. List of interviewers and the questionnaires are attached as Annex 2. 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 mammals' category, Common Leopard, Pallas cat, Mongoose, Leopard cat, Hyena, Grey Goral, Hare, Chinkara, Jackal, Wild boar and Porcupine have been sighted in the Agency. The hotspots for several of these mammals are in the hills of Loi Shalman, Mulagori, Jamrud and Tirah. Common leopard and Black Bear were also said to be present in the Agency but no one has sighted any recently. Common leopard, Black Bear, Chinkara and Hare are becoming increasingly rare to sight.
    The birds found in the Agency, as reported by the survey respondents, include Long Legged Buzzard, Hobby, Saker Falcon, Peregrine Falcon, Rose Finch, Indian Blue Robin, Grey Tree Pie, Red Headed Bunting, Crested Bunting, Green Tit, Red Crowned Eurasian Jay, Blue Throated Fly Catcher, White Throated Dipper, Green Warbler, Himalayan Tree Creeper, White Throated Laughing Thrush , River Chat , Magpie Robin, Rosy Pastor, Blue Whistling Thrush, Common Bubbler, Owlet, Western Swallow, Parakeet, Hoopoe, Paradise Fly

Catcher, Red Vented Bulbul, White Cheeked Bulbul, Chukar, Grey Partridge, See-See Partridge and Quail. Water fowls include Spoonbill and Little Ringed Plover.

79. The hotspots for these birds and waterfowls are irrigation dams, khwars and river beds and banks, especially around the Ali Masjid area.

Fisheries

80. 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.

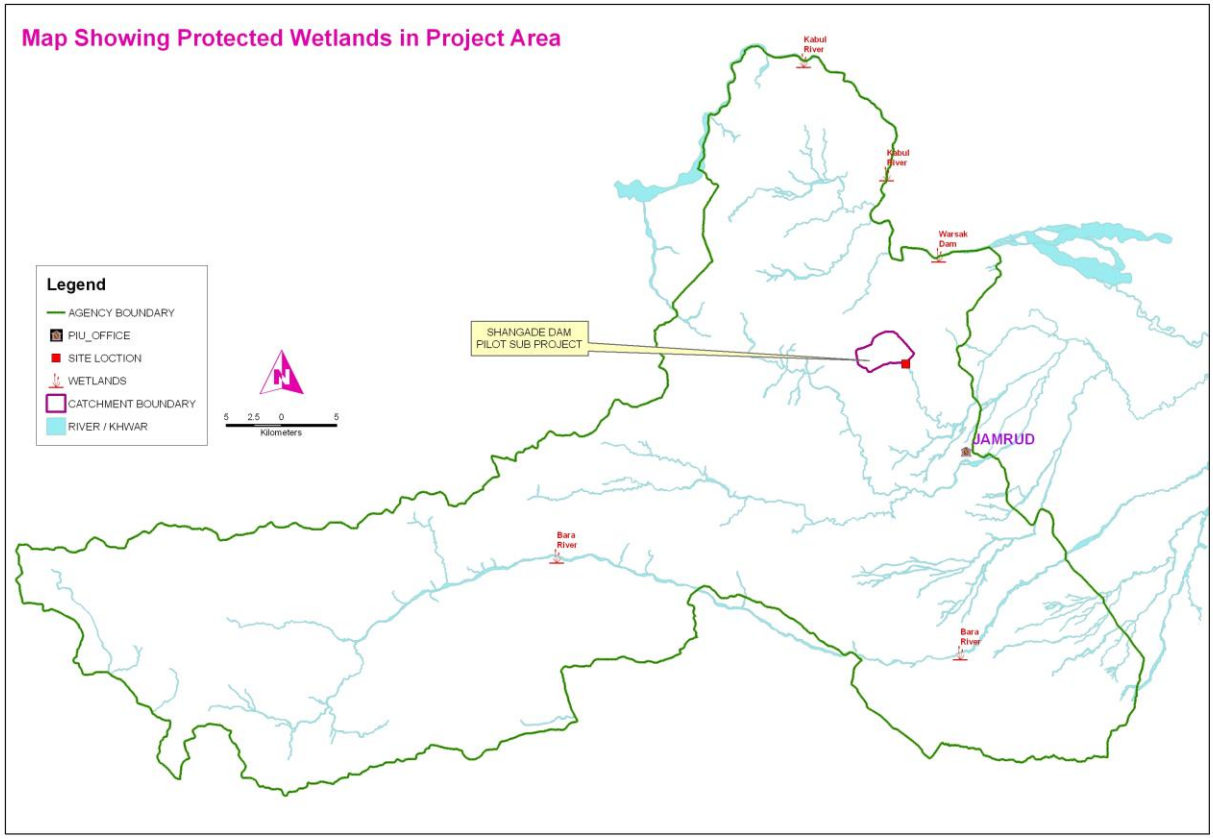
Table 6 List of Wild Fish found in Khyber Agency (FATA)

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

81. 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 SDIP, 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. Both of these are attached as Annexures 1 and 2.



3. Social, Economic, and Cultural Resources[6]

a. Demography

82. Total population of the Agency in 1998 was about 546,000persons, out of which 52% are males and 48% are female population. Furthermore, it has been estimated to have increased to about 1.0 million by 2013, with growth rate of 3.92%. The population density is about 391 persons per km^2 while the male-female ratio is 1:1.09[7].
83. The project site is situated in northwest of Jamrud tehsil having a population of approximately 3558 persons, and 391 households. Afridis are the main tribe and are further sub divided into Zakha Khel sub tribe.

[6] The section benefits mainly from the Social Assessments carried out under the PPTA, unless mentioned otherwise
[7] FWRDP Inception Report, Important Agency/FR wise Socioeconomic Indicators of FATA 2012

Table 7 Settlement Details of Khyber Agency[8]

S.No	Tehsil	Villages	Houses	Average H.H Size	Population No
1.	Bara	218	29,504	9.7	286,184
2.	Jamrud	31	9,524	10.1	96,188
3.	Landi Kotal	60	14,188	10.2	144,714
4.	Mulagori	16	1,964	10.0	19,644
Total		**325**	**55,225**	**9.9**	**546,730**

Source: Water Assessment Study and Management Plan, 2010

b. Family Size

84. Average family size in the Project area is calculated as 10 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

85. Majority of the houses (90%) of the study area have ordinary construction (Katcha structure) with timber roof and mud mortar, whereas dry stone masonry (semi-pacca structure) are 10%.

d. Social Organization

86. 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

87. 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

[8] Water Assessment Study and Management Plan, 2010

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

88. 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

89. A primary survey was conducted as part of the Social Feasibility Study carried out under the PPTA. 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. Majority has a religious disposition and practice Islam according to its fundamental principles. Inheritance is divided according to the Islamic principles and daughters are given their property right accordingly.

h. Infrastructure

90. Khyber Agency is predominantly rural, with limited public infrastructure. Although larger in area, number of black topped roads is relatively better as compared to the rest of FATA. With Jamrud and Landi Kotal being active Pak Afghan Trade routes, communications, in terms of telephones and post offices is relatively sufficient.

i. Cropping Pattern

91. 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

92. For Shangade area, out of the total sample size of the Primary Social Survey, 25 percent households were found to be involved in farming activities, 35 percent as daily wage laborers, while 20 percent reported to be in government services. About 8% of the population reported to be small traders or vendors engaged in small scale business (shops, stores, auto workshops, hotel etc.), while 4 percent were associate with self-owned services (Drivers for trucks, trailers) and in 8% of cases, earnings were coming from abroad. The average annual household income was reported to be PKR312,000, which comes from all sources of income of a given household, such as livestock, remittances etc. from inland and outside the country. For cooking fuel, 80% of the population is using both wood and dung while 20% also use kerosene oil.

k. Livestock

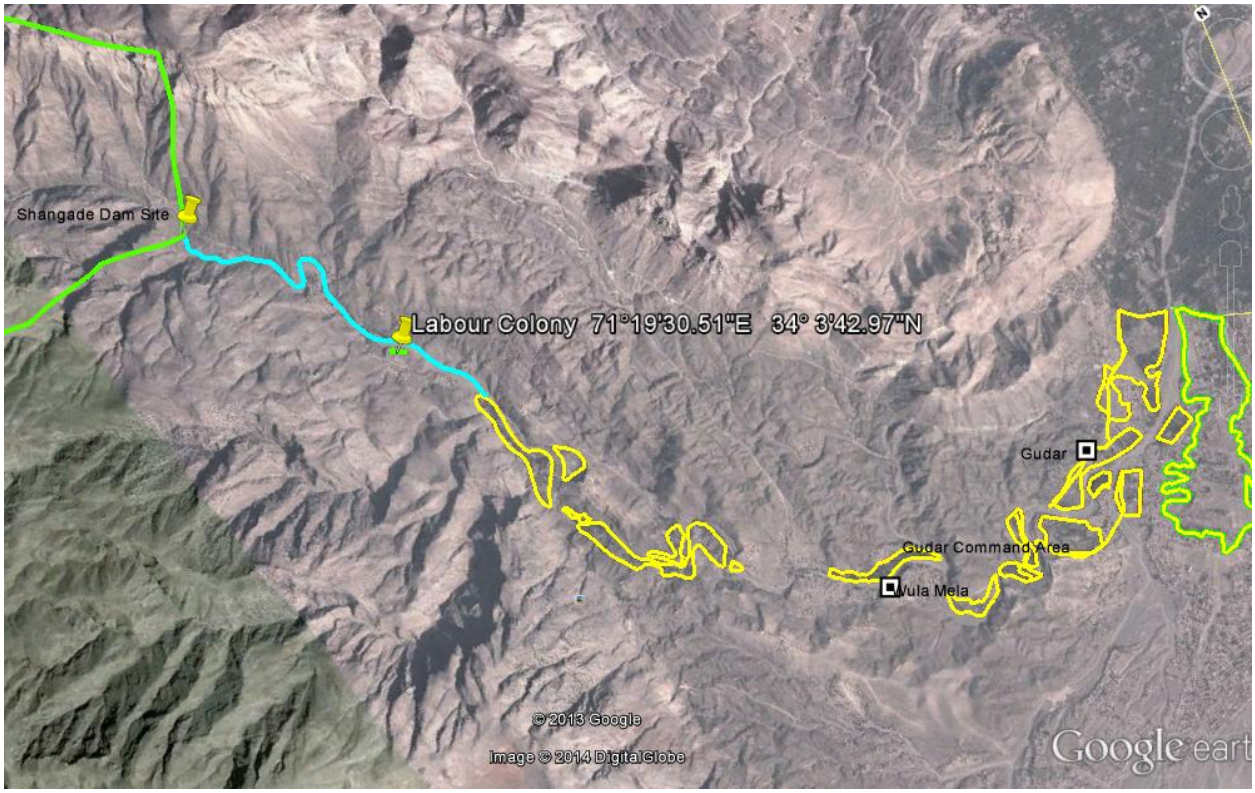
93. Livestock rearing is considered to be an important source of income as well. Like other areas of Pakistan, people practice rearing livestock as an income source. Nearly 59% population reported to have livestock in which sheep and goats surfaced as maximum in number. In addition, cows, buffalos and horses are also reared to some extent.

l. Culturally and Socially Significant Sites

94. No sites have been reported around the SDIP site of any cultural and social significance.

E. Anticipated Environmental Impacts and Mitigation Measures

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



96. Above image demonstrates the location of the dam, of the proposed labor camp at a distance of 2 km, and the command area (yellow polygons) that will be developed by using the irrigation water. The area as can be observed has no or denuded vegetation, with the dam site being located in an isolated area.

97. 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

98. 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

99. 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

100. 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 SDIP, the site does not have extensive vegetation in terms of trees, but the area is uneven.

Mitigation

101. 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

102. 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

103. 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

104. Labor camps are planned to be located at a distance of 2 km from the site, keeping in mind availability of flat surface as well as security. Since the area is barren, 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. Dam site is easily accessible from Jamrud via Gudar, Walo Mela road. It has a distance of about 12 km from main Jamrud road of which approximately 6 km road is shingle gravel. Since carriage of construction material can easily be transported to the dam site, 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

105. 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

106. 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

107. 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

108. The soil texture at the SDIP site is light textured with low organic load. Due to the sand formation upstream, there is a likelihood of sedimentation load filling up the dam.

Mitigation

109. 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

110. 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

111. Cultivation of high delta crops will be strictly discouraged, keeping in mind the semi-arid climate of the area, and the water balance model[9].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

112. 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.

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

Mitigation

113. 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

114. 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

115. 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

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

Mitigation

117. 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

118. 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 close to village Wula Mela, dust and emissions will be irritants for the villagers, as well as the labor itself.

Mitigation

119. 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

120. 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

121. 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

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

Mitigation

123. 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

124. 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

125. 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

126. 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

127. 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

128. 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

129. 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

130. 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

131. 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

132. 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.

133. For SDIP, 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.

134. 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. AsifShuja 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. Masal Khan	Community Member, Gudar	11/02/14
12. Mr. Ismail Khan	Community Member, Gudar	11/02/14
13. Mr. . Gul Muhammad	Community Member, Jabba	11/02/14
14. Haji Rambeel Khan	Community Member, Gudar	11/02/14
15. MrSaeed Khan	Community Member, Gudar	11/02/14
16. Mr. Mesri Khan	Community Member, Ghondee	11/02/14

1. Summary of Consultations

a. Federal level stakeholders

135. 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.

b. Line Departments (FATA and KP Government)

136. 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.

c. Civil Society

137. 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.

d. Communities

138. 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.

e. Future Consultations

139. 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

140. 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.

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

142. 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.

143. 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.

144. 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.

145. A pre-mobilization public consultation meeting will be convened by the FATA Secretariat for SDIP, and will be attended by GFPs, contractor, Political Agents' representative and other interested parties (eg. 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.

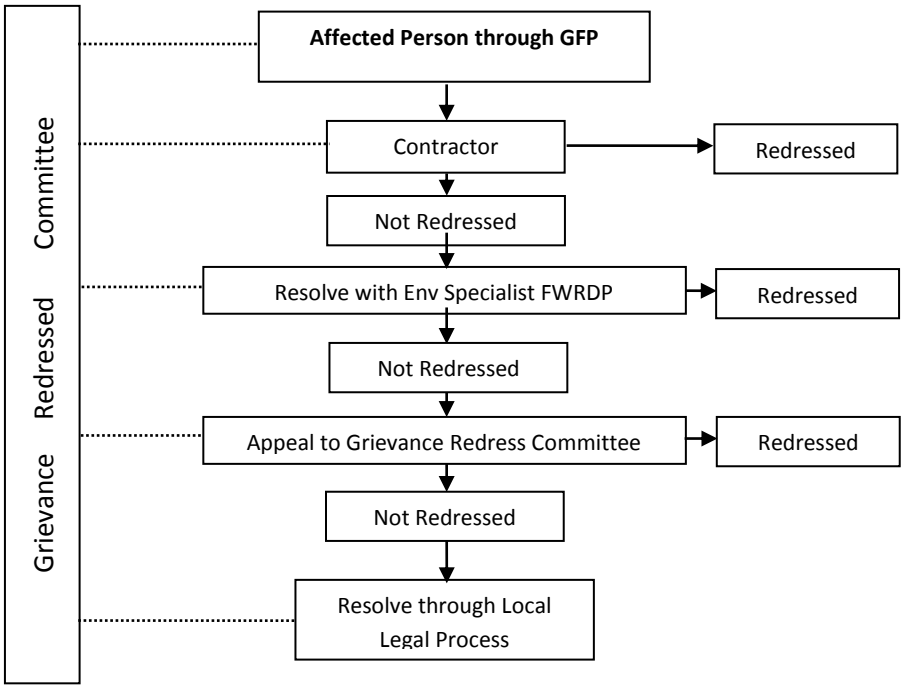
(vi) If the Complaint is not resolved within 2 weeks the GFP will present the complaint to the Grievance Redress Committee (GRC).

(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

146. 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

147. 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

148. For an 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.

149. For SDIP, an EMU is proposed to be set up within the Project Director's (PD) Office at the E/IA level, with direct reporting line to the PD. Ideally, 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.

150. The responsibilities of EMU will be the following, but not limited to:

- Ensure effective compliance of EMP as per ADB Safeguards 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, Pak 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 2 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 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 throughbi-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 SDIP

	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		0.6
	Total Costs	**6.2**

I. Conclusion and Recommendation

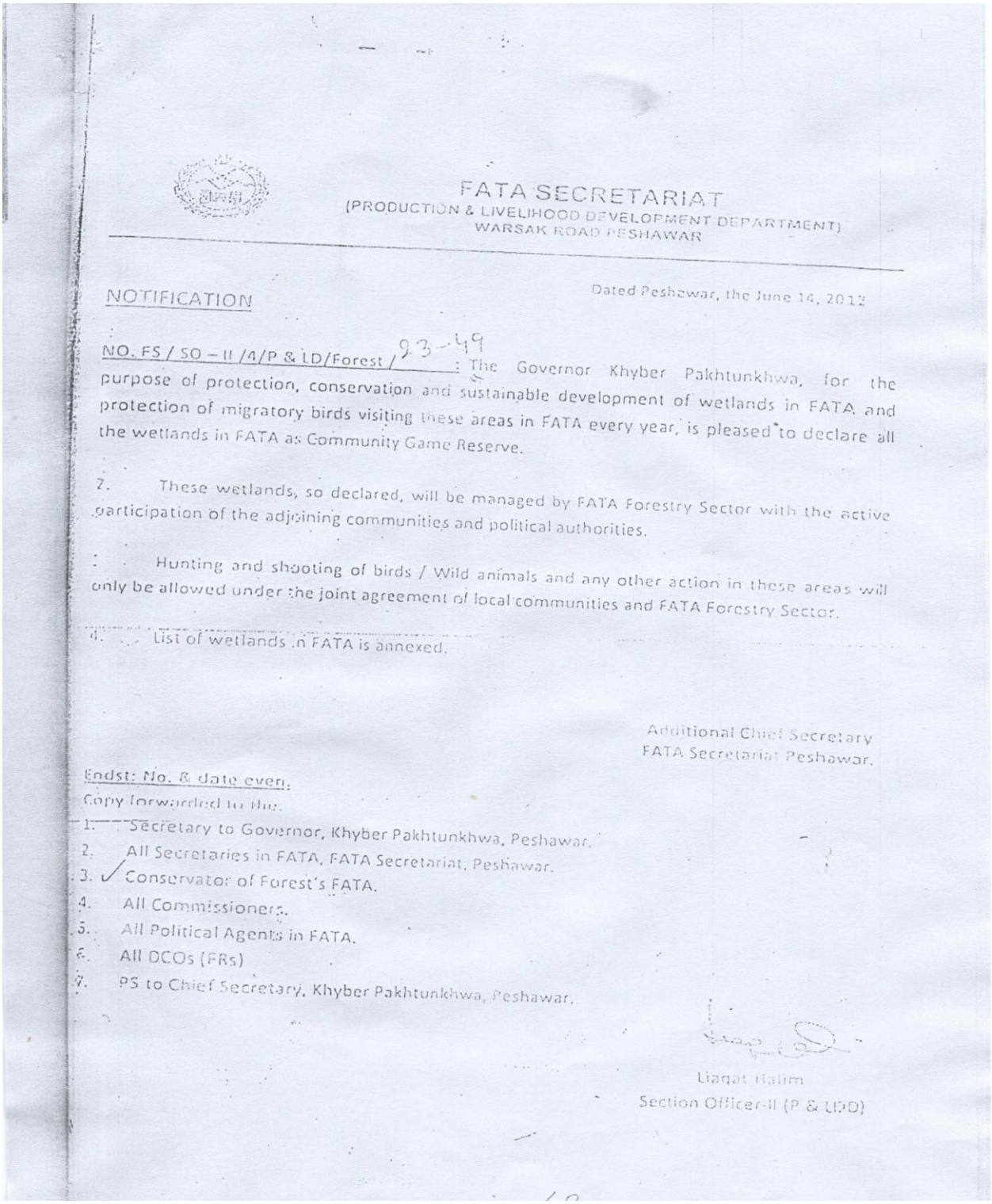
157. As the IEE report shows, there are no significant environmental and social impacts of SDIP that could cause irreversible damage to the physical environment or the social fabric of the society. Besides, the project area is also not a critical habitat, nor home to species of special concern. Hence Environmental Impact Assessment (EIA) for SDIP is not required.

158. The suggested EMP includes mitigation measures, and also identifies responsibilities pre, during and post construction phases. Also, detailed objectives and terms of reference are described. 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.

159. Overall, the project should bear positive environmental as well as socioeconomic impacts for the beneficiaries, as long as EMP is followed to its letter and spirit.

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 / 93-49 : 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 /A/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 Dam Location vis-à-vis River System of Khyber Agency

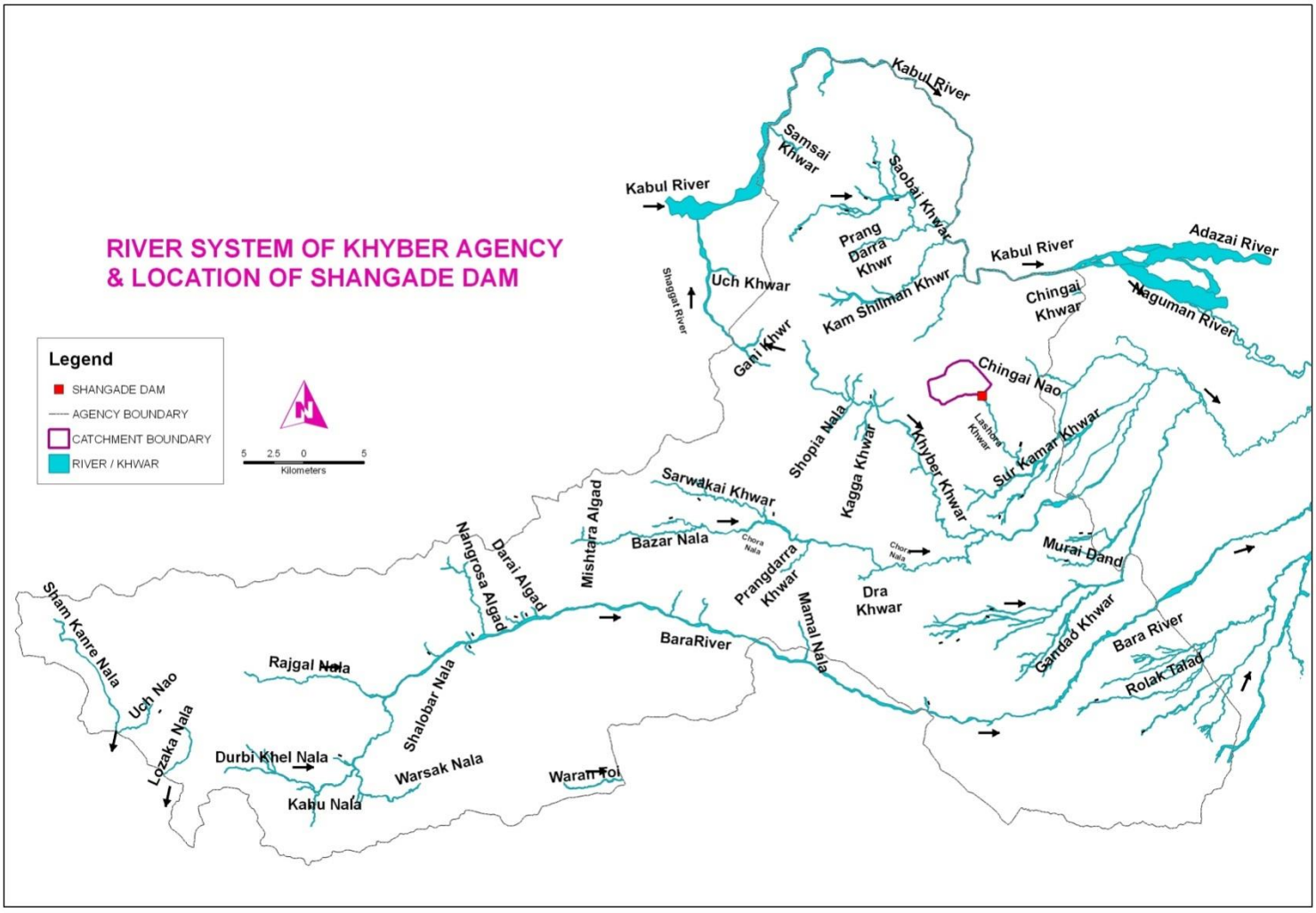


Figure 2 Location, Catchment & Command Area of Shangade Dam

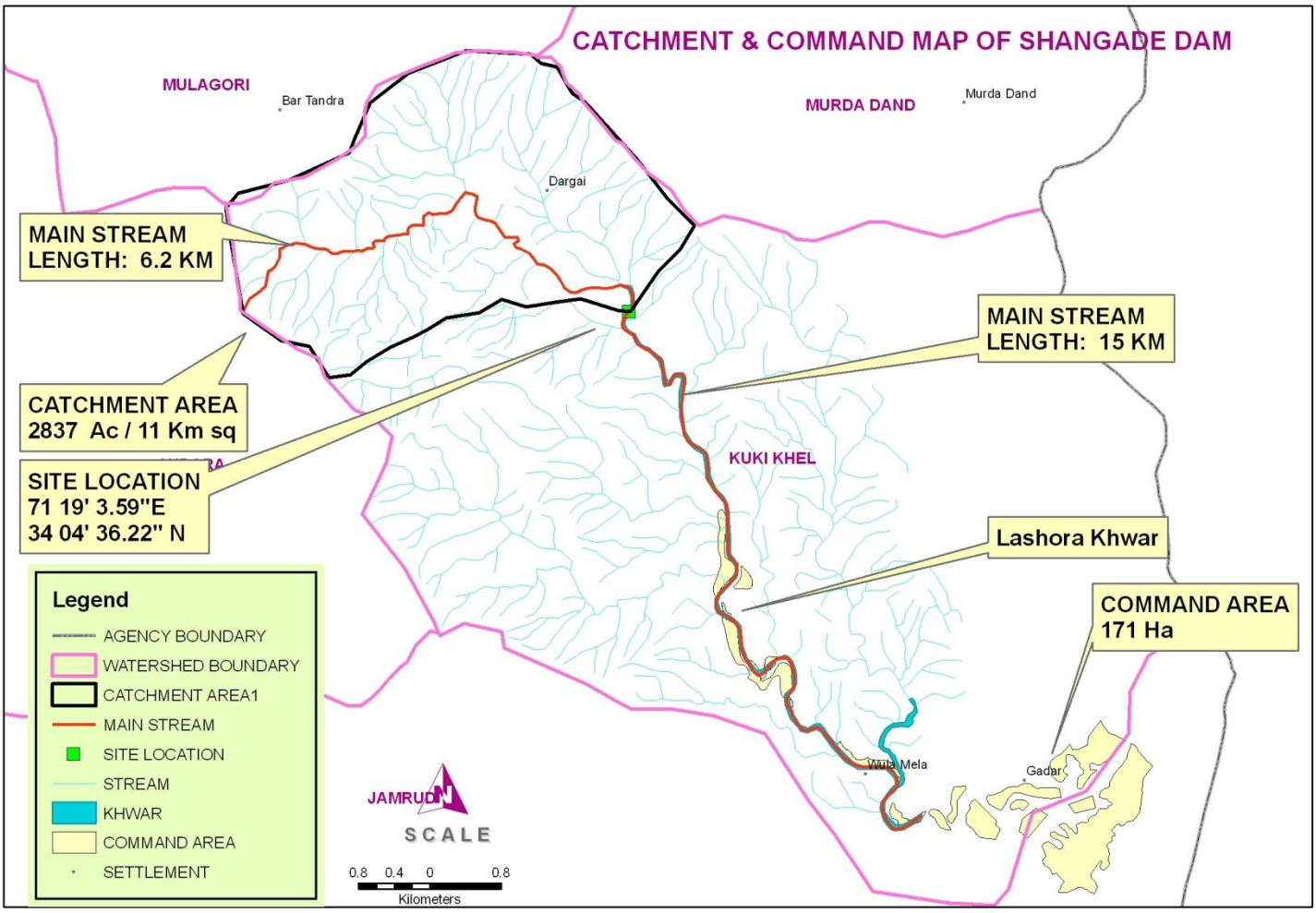
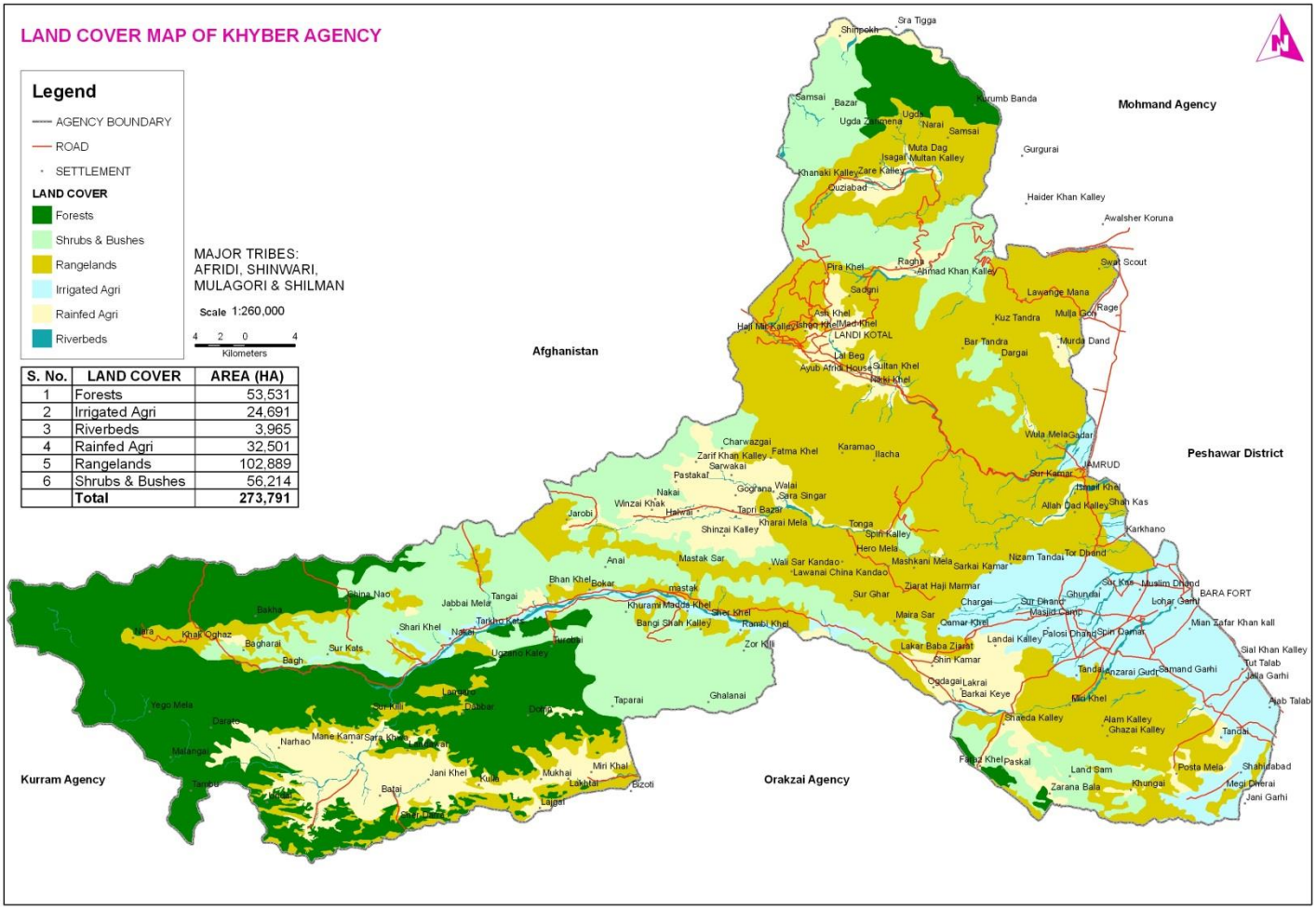


Figure 3 Land Cover of Khyber Agency



S. No.	LAND COVER	AREA (HA)
1	Forests	53,531
2	Irrigated Agri	24,691
3	Riverbeds	3,965
4	Rainfed Agri	32,501
5	Rangelands	102,889
6	Shrubs & Bushes	56,214
	Total	**273,791**

Figure 4 Dam Location vis-à-vis Tectonic Map of Pakistan

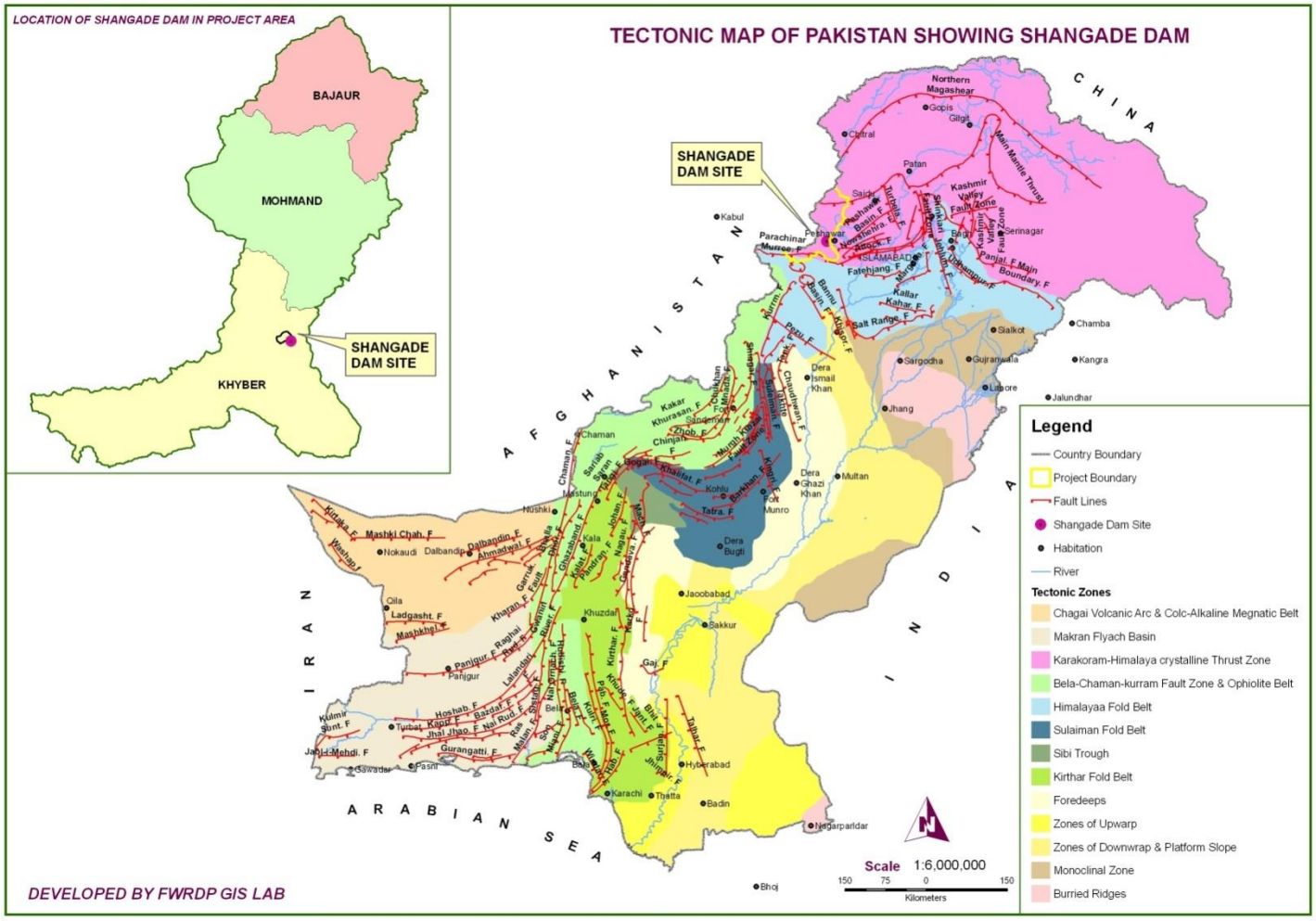


Figure 5 Dam Location vis-à-vis Seismic Zones of Pakistan

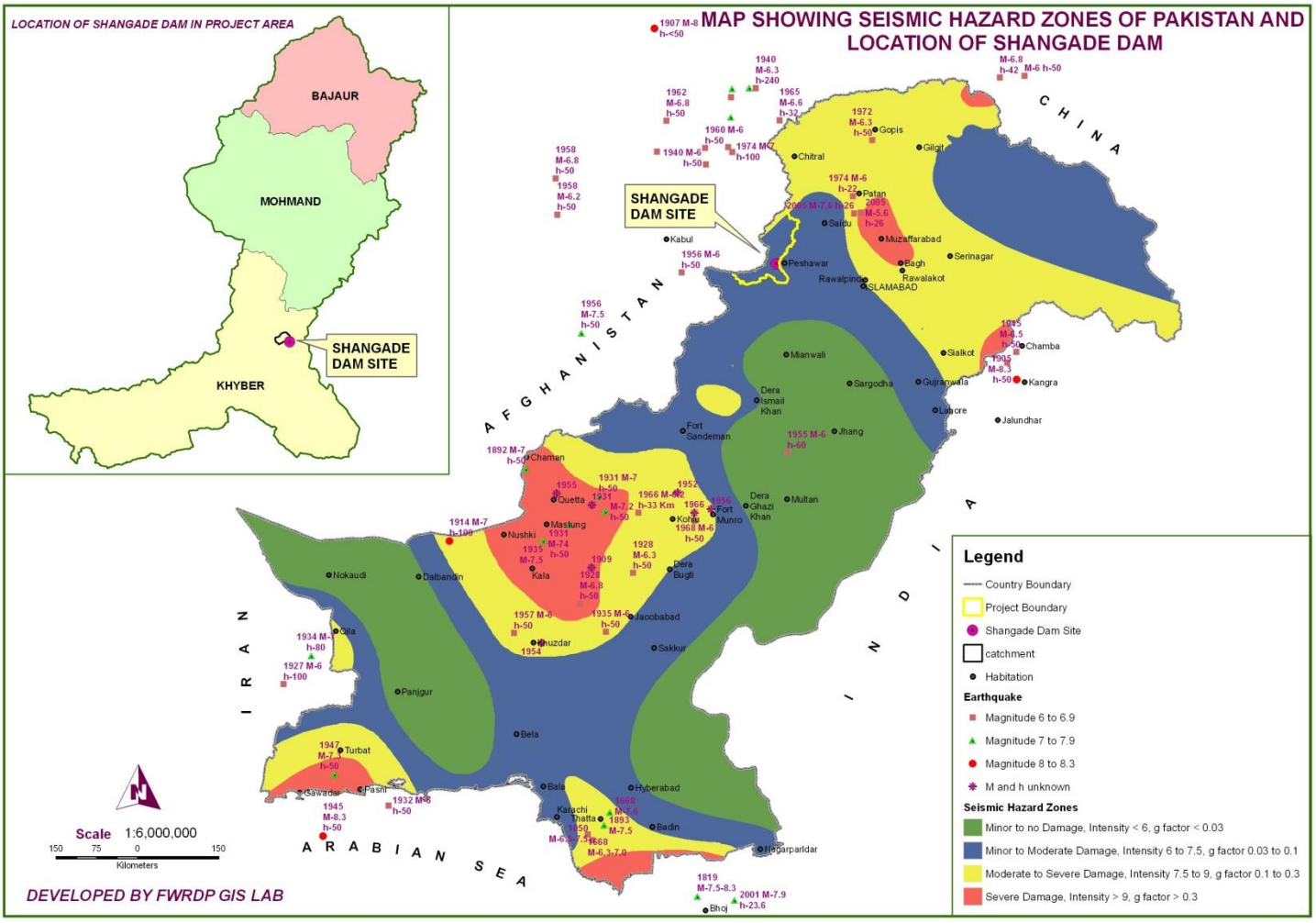


Figure 6 Land Cover of Shangade

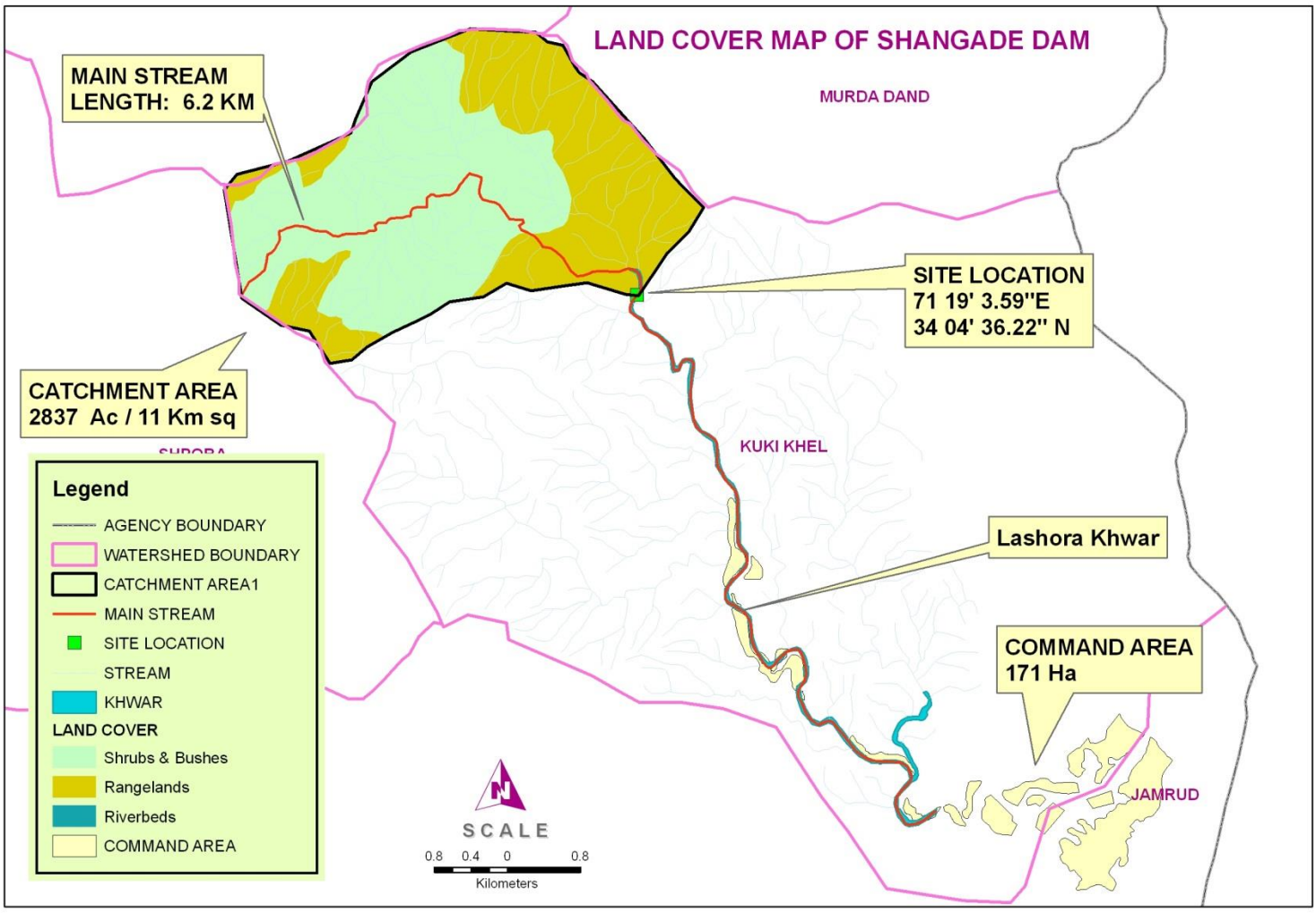


Figure 8 Cropping Calendar for Khyber Agency

Cropping Calendar in the Project Area Khyber 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				