

Environmental Impact Assessment

September 2019

PAK: Balakot Hydropower Development Project

Volume B – Appendices

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Hagler Bailly Pakistan

**Balakot Hydropower
Development Project**

**Environmental Impact
Assessment**

**Volume II – Appendices
Final**

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Appendix A: Environmental Quality Standards (NEQS)

Exhibit A.1: NEQS and IFC Guideline Limits for Municipal and Liquid Industrial Effluents^{1, 2}

mg/l, unless otherwise defined

No.	Parameter	Standards			
		Into Inland Waters	Into Sewage Treatment ³	Into Sea ⁴	IFC
1.	Temperature increase ⁵	=<3°C	=<3°C	=<3°C	_13
2.	pH value	6 to 9	6 to 9	6 to 9	6 to 9
3.	Five-day bio-chemical oxygen demand (BOD) ⁵ at 20°C ⁶	80	250	80 ⁷	–
4.	Chemical oxygen demand (COD)	150	400	400	–
5.	Total suspended solids (TSS)	200	400	200	50
6.	Total dissolved solids (TDS)	3,500	3,500	3,500	–
7.	Grease and oil	10	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.3	0.3	–
9.	Chlorides (as Cl')	1,000	1,000	SC ⁸	–
10.	Fluorides (as F')	10	10	10	–
11.	Cyanide total (as CN')	1.0	1.0	1.0	–
12.	Anionic detergents (as MBAS) ⁹	20	20	20	–
13.	Sulfates (SO ₄)	600	1,000	SC ⁸	–
14.	Sulfides (s')	1.0	1.0	1.0	–
15.	Ammonia (NH ₃)	40	40	40	–
16.	Pesticides ¹⁰	0.15	0.15	0.15	–
17.	Cadmium ¹¹	0.1	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	0.5
19.	Copper ⁴	1.0	1.0	1.0	0.5
20.	Lead ⁴	0.5	0.5	0.5	0.5
21.	Mercury ⁴	0.01	0.01	0.01	0.005

No.	Parameter	Standards			
		Into Inland Waters	Into Sewage Treatment ³	Into Sea ⁴	IFC
22.	Selenium ⁴	0.5	0.5	0.5	–
23.	Nickel ⁴	1.0	1.0	1.0	–
24.	Silver ⁴	1.0	1.0	1.0	–
25.	Total toxic metals	2.0	2.0	2.0	–
26.	Zinc	5.0	5.0	5.0	1.0
27.	Arsenic ⁴	1.0	1.0	1.0	0.5
28.	Barium ⁴	1.5	1.5	1.5	–
29.	Iron	8.0	8.0	8.0	1.0
30.	Manganese	1.5	1.5	1.5	–
31.	Boron ⁴	6.0	6.0	6.0	–
32.	Chlorine	1.0	1.0	1.0	0.2

Explanations:

1. Dilution of liquid effluents to bring them to the NEQS limiting values is not permissible through fresh water mixing with the effluent before discharging into the environment.
2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the NEQS limits.
3. Applicable only when and where sewage treatment is operational and BOD = 80 mg/l is achieved by the sewage treatment system.
4. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.
5. The effluent should not result in temperature increase of more than 3°C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not define, use 100 m from the point of discharge
6. Assuming minimum dilution 1:10 discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
7. The value for industry is 200 mg/l
8. Discharge concentration at or below sea concentration (SC)
9. Modified Benzene Alkyl Sulfate assuming surfacetant as biodegradable.
10. Pesticides include herbicides, fungicides, and insecticides
11. Subject to total toxic metals discharge should not exceed level given at S. No. 25.
12. A “-” in the third column indicates that IFC has not provided any guidelines for the parameter or they are to be established by the environmental assessment.
13. IFC General Guidelines describes “temperature of wastewater prior to discharge does not result in an increase greater than 3 °C of ambient temperature at the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use and assimilative capacity among other considerations”.

Exhibit A.2: NEQS and WHO Standards for Drinking Water Quality

<i>Properties/Parameters</i>	<i>NEQS</i>	<i>WHO Standards</i>	<i>Remarks</i>
Bacterial			
All water intended for drinking (<i>E.Coli</i> or Thermotolerant Coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (<i>E.Coli</i> or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system <i>E.Coli</i> or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian countries also follow WHO standards
	In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	
Physical			
Color	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	< 5 NTU	< 5 NTU	
Total hardness as CaCO ₃	< 500 mg/L	–	
TDS	< 1000 mg/L	< 1000 mg/L	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
<i>Essential Inorganic</i>	mg/Litre	mg/Litre	
Aluminium (Al)	≤0.2	0.2	
Antimony (Sb)	≤ 0.005 (P)	0.02	

<i>Properties/Parameters</i>	<i>NEQS</i>	<i>WHO Standards</i>	<i>Remarks</i>
Arsenic (As)	≤ 0.05 (P)	0.01	Standards for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium	0.01	0.003	Standards for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	mg/Litre	mg/Litre	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to most Asian developing countries
Flouride (F)	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	
Nitrate (NO ₃)*	≤50	50	
Nitrite (NO ₂)*	≤ 3 (P)	3	
Selenium (Se)	0.01 (P)	0.01	
Residual chlorine	0.2–0.5 at consumer end 0.5–1.5 at source	–	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries
Organic			
Pesticides mg/L		PSQCA No. 4639–2004 Page no. 4 Table No. 3 Serial No. 20–58 may be consulted.**	Annex II
Phenolic compounds (as Phenols) mg/L		≤ 0.002	

<i>Properties/Parameters</i>	<i>NEQS</i>	<i>WHO Standards</i>	<i>Remarks</i>
Polynuclear aromatic hydrocarbons (as PAH) g/L		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

* indicates priority health related inorganic constituents which need regular monitoring

** PSQCA: Pakistan Standard Quality Control Authority

Exhibit A.3: NEQS for Gaseous Emissions

mg/Nm³, unless otherwise defined

<i>No.</i>	<i>Parameter</i>	<i>Source of Emission</i>	<i>Standards</i>
1.	Smoke	Smoke opacity not to exceed	40% or 2 on Ringlemann Scale or equivalent smoke number
2.	Particulate matter ¹	(a) Boilers and furnaces:	
		i) Oil-fired	300
		ii) Coal-fired	500
		iii) Cement kilns	300
		(b) Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
3.	Hydrogen chloride	Any	400
4.	Chlorine	Any	150
5.	Hydrogen fluoride	Any	150
6.	Hydrogen sulfide	Any	10
7.	Sulfur oxides ^{2, 3}	Sulfuric acid/sulfonic acid plants	5,000
		Other plants except power plants operating on oil and coal	1,700
8.	Carbon monoxide	Any	800
9.	Lead	Any	50
10.	Mercury	Any	10
11.	Cadmium	Any	20
12.	Arsenic	Any	20
13.	Copper	Any	50

No.	Parameter	Source of Emission	Standards
14.	Antimony	Any	20
15.	Zinc	Any	200
16.	Oxides of nitrogen ³	Nitric acid manufacturing unit	3,000
		Gas-fired	400
		Oil-fired	600
		Coal-fired	1,200

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 per cent sulfur content in fuel oil. Higher content of sulfur will cause standards to be pro-rated.
3. In respect of emissions of sulfur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) special above, comply with the following standards.

Exhibit A.4: NEQS for Sulfur Dioxide and Nitrogen Oxides for Power Plants Operating on Oil and Coal

A. Sulfur Dioxide

<i>Sulfur Dioxide Background Levels (mg/m³)</i>			<i>Standards</i>	
<i>Background Air Quality (SO₂ basis)</i>	<i>Annual Average</i>	<i>Maximum 24-Hour Interval</i>	<i>Criterion I Max. SO₂ Emissions (TPD)</i>	<i>Criterion II Max. Allowable 1-Year Average Ground Level Increment to Ambient (mg/m³)</i>
Unpolluted	< 50	< 200	500	50
Moderately polluted ¹				
Low	50	200	500	50
High	100	400	100	10
Very polluted ²	> 100	> 400	100	10

1. For intermediate values between 50 and 100 µg/m³ linear interpretation should be used.
2. No project with sulfur dioxide emissions will be recommended.

B. Nitrogen Oxides

Annual arithmetic mean of ambient air concentrations of nitrogen oxides (expressed as NO₂) should not exceed 100 µg/m³ (0.05 ppm)

Maximum emission levels for stationary source discharges, before mixing with the atmosphere:
For fuel fired steam generators

Liquid fossil fuel	130 ng/J of heat input
Solid fossil fuel	300 ng/J of heat input
Lignite fossil fuel	260 ng/J of heat input

Exhibit A.5: NEQS for Motor Vehicle Exhaust and Noise

<i>No.</i>	<i>Parameter</i>	<i>Standards (Maximum Permissible Limit)</i>	<i>Measuring Method</i>
1.	Smoke	40% or 2 on the Ringelmann Scale during engine acceleration mode.	To compared with Ringlemann chart at a distance of 6 meters or more.
2.	Carbon Monoxide	Emission Standards:	
		New Vehicles	Used Vehicles
		4.5%	6%
			Under idling conditions: Nondispersive infrared detection through gas analyzer.
3.	Noise	85 db (A)	Sound-meter at 7.5 meters from the source.

Exhibit A.6: NEQS for Motor Vehicle Exhaust and Noise**Exhibit A.6.a: for passenger Cars and Light Commercial Vehicles (g/Km)**

Type of Vehicle	Category/Class	Tiers	CO	HC+NO _x	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8
Passenger Cars.	M 1: with reference mass (RW).	Pak-II, IDI	1.0	0.7	0.08		All imported and local manufactured
	up to 2500 kg. Cars with RW over 2500 kg. to meet NI Category standards	Pak-II DI	1.0	0.9	0.10	NEDC (ECE 15+ EUDCL)	Diesel vehicles with effect from 01-07-2012
Light Commercial Vehicles	NI-I (RW<1250 Kg)	Pak-II IDI	1.0	0.70	0.08		
		Pak-II DI	1.0	0.90	0.10		
	NI-II(1250kg< RW < 1700 Kg)	Pak-II IDI	1.25	1.0	0.12		
		Pak-II DI	1.25	1.3	0.14		
	NI-III(RW< 1700 Kg)	Pak-II IDI	1.50	1.2	0.17		
		Pak-II DI	1.50	1.6	0.20		

Exhibit A.6b: for Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Category/Class	Tiers	CO	HC	NO _x	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8	9
Heavy Duty Diesel Engines	Turks and Buses	Pak-II	4.0	1.1	7.0	0.15	ECE-R-49	All Imported and local manufactured diesel vehicles with the effect 1-7-2012
Large goods Vehicles	N2(2000 and up)	Pak-II	4.0	7.0	1.10	0.15	EDC	

Exhibit A.6.c: Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/ Class	Tier	Co	HC+ NOx	Measuring Method	Applicability
1	2	3	4	5	6	7
Passenger Cars	M 1: with reference mass (RW). upto 2500 kg. Cars with RW over 2500 kg. to meet NI Category standards	Pak-II	2.20	0.5	NEDC (ECE 15+ EUDCL)	All imported and new models * locally manufactured petrol vehicles with effect from 1 st July, 2009**
Light Commercial Vehicles	NI-I (RW<1250 kg) NI-II (1250kg> kg RW < 1700 Kg)	Pak-II Pak-II	2.20 4.0	0.5 0.65		
	NI-III(RW> 1700 kg)	Pak-II	5.0	0.08		
Motor Rickshaws & Motor Cycles	2,4 strokes < 150 cc	Pak-II	5.5	1.5	ECER 40	
	2,4 strokes > 150cc	Pak-II	5.5	1.3		

Exhibit A.7: NEQS and IFC Environmental Quality Standards for Ambient Air

Pollutants	Time-weighted Average	Concentration in Ambient Air	
		NEQS	IFC ¹
Sulphur Dioxide (SO ₂)	Annual Average*	80 µg/m ³	–
	24 hours**	120 µg/m ³	125 µg/m ³
Oxide of Nitrogen as (NO)	Annual Average*	40 µg/m ³	–
	24 hours**	40 µg/m ³	–
Oxide of Nitrogen as (NO ₂)	Annual Average*	40 µg/m ³	40 µg/m ³
	24 hours**	80 µg/m ³	–
O ₃	1 hour	130 µg/m ³	–
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m ³	–
	24 hours**	500 µg/m ³	–
Respirable particulate Matter. PM ₁₀	Annual Average*	120 µg/m ³	70 µg/m ³
	24 hours**	150 µg/m ³	150 µg/m ³
Respirable Particulate Matter. PM _{2.5}	Annual Average*	15 µg/m ³	35 µg/m ³
	24 hours**	35 µg/m ³	40 µg/m ³
	1 hour	15 µg/m ³	–
Lead (Pb)	Annual Average*	1 µg/m ³	–
	24 hours**	1.5 µg/m ³	–
Carbon Monoxide (CO)	8 hours**	5 mg/m ³	–
	1 hour	10 mg/m ³	–

- * Annual arithmetic mean of minimum 104 instruments in a year taken twice a week 24 hourly at uniform interval
- ** 24 hourly /8 hourly values should be met 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days.
- *** Annual average limit of 40 µg/m³ or background annual average concentration plus allowable allowance of 9, whichever is low.
NEQS standards effective: 1st Jan, 2013
SEQS standards effective: 1st July, 2014

¹ International Finance Corporation, 'General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality', World Bank Group

Exhibit A.8: NEQS for Noise

No.	Category of Area/Zone	Effective from 1 st July, 2010		Effective from 1 st July, 2012	
		Limit in dB(A) Leq			
		Day time	Night time	Day time	Night time
1.	Residential area (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence zone (D)	55	45	50	45

Note:

1. Day time hours: 6 .00 am to 10.00 pm
2. Night Time hours: 10.00 pm to 6.00 am
3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts and courts.
4. Mixed categories of areas may be declared as one of the four above–mentioned categories by the competent authority.

*dB(A) Leq: time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

Exhibit A.9: IFC Guidelines for Noise

No.	Receptor	One Hour Leq dB(A)	
		Day time	Night time
		07:00 – 22:00	22:00 – 07:00
1.	Residential; institutional; educational ¹	55	45
2.	Industrial; commercial	70	70

Note: For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO (1999)

Appendix B: Physical Environment Survey Plan

B.1 Physical Environment Study Area

The Study Area selected for the study takes account of sensitive receptors¹ that are most likely to be impacted by the Project's development activities. The area of influence for physical environment is generally within the valley around the Project Dam and Powerhouse sites.

The following surveys are planned:

- ▶ Visual Character
- ▶ Air Quality
- ▶ Noise
- ▶ Traffic
- ▶ Water Quality (on-site testing and sampling for lab analysis)
- ▶ Hydro census

The Project location is shown in **Exhibit B.1**.

¹ Sensitive receptors include, but are not limited to, residential areas, schools, places of worship etc. These are areas where the occupants are more susceptible to the adverse effects of an anthropogenic activity such as noise, air emissions, traffic influx, privacy issues etc.

Exhibit B.1: Project Location



B.2 Visual Baseline

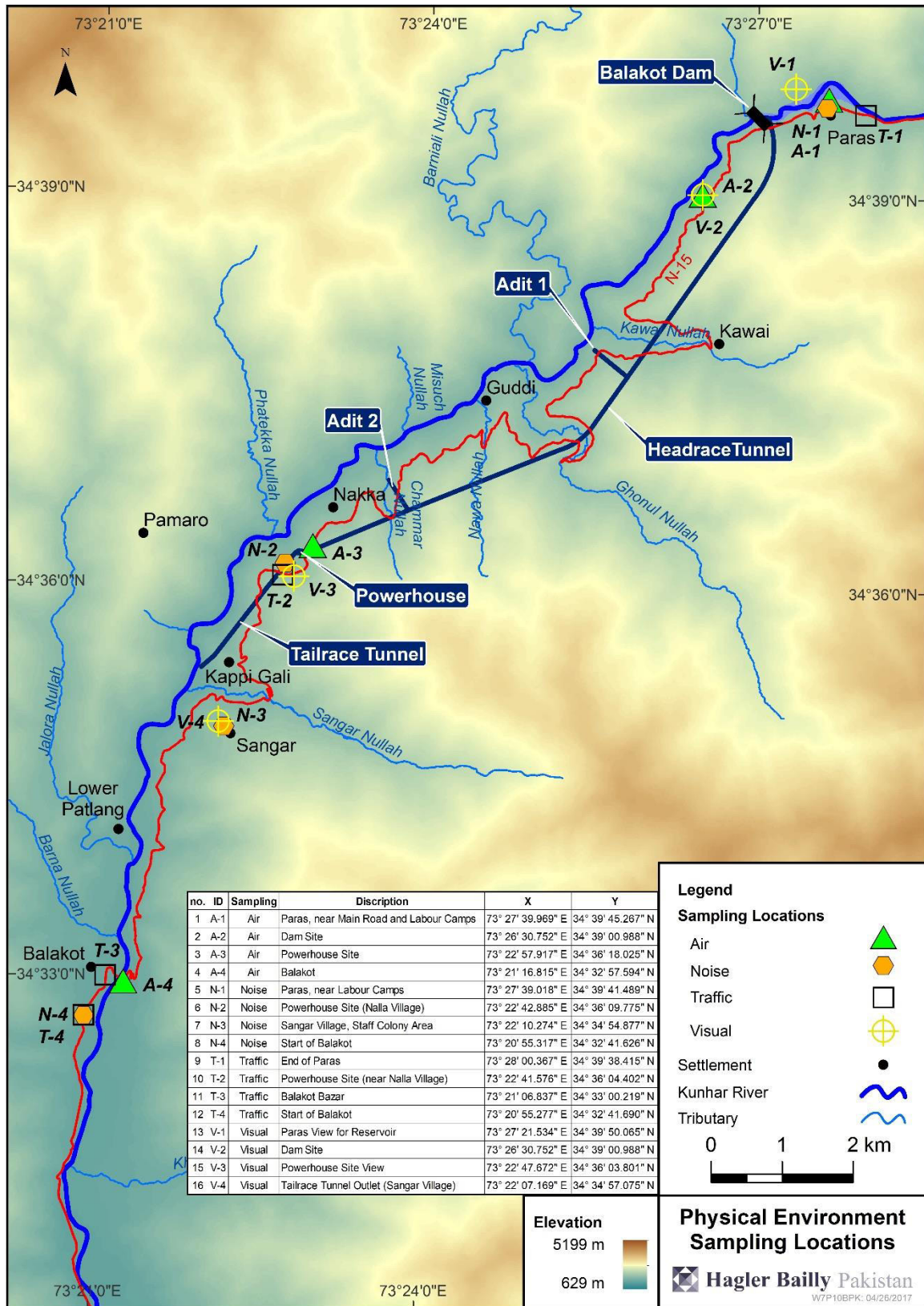
A visual baseline survey will be carried out to establish the current aesthetic and visual conditions. The details of sampling locations are given in **Exhibit B.2** and are shown in **Exhibit B.3**.

Exhibit B.2: Proposed Visual Survey Locations

<i>Sample ID</i>	<i>Coordinates</i>	<i>Location Description</i>
V1	34° 39' 50.065" N 73° 27' 21.534" E	Paras view (reservoir)
V2	34° 39' 00.988" N 73° 26' 30.752" E	Dam site view
V3	34° 36' 03.801" N 73° 22' 47.672" E	Powerhouse site view
V4	34° 34' 57.075" N 73° 22' 07.169" E	Trailrace Tunnel outlet view (Sangar village)

Note: Actual locations will vary slightly based on site conditions

Exhibit B.3: Physical Environment Survey Locations



B.2.1 Equipment and Methods

The photographs will cover an 180° view in the direction of the Project activities. Data collection will include:

- ▶ Photographs from at least three locations at each site using a tripod, covering a 180 degree view from each location.
- ▶ Record of bearings using a compass, in degrees, for the photographs.
- ▶ GPS coordinates of the locations, and marking of locations on a map.
- ▶ Height and distance of significant topographical features, if any, will be estimated using Google Earth.

The following materials and equipment will be utilized:

- ▶ Camera
- ▶ Map
- ▶ Compass (with correction for magnetic north vs map north)
- ▶ GPS
- ▶ Tripod
- ▶ Visual Survey Form (see **B.9**, *Survey Forms*)

B.3 Air Quality

Air quality survey will be carried out to establish the current ambient conditions. The survey will cover following Project components.

- ▶ Dam and reservoir
- ▶ Powerhouse
- ▶ Access roads
- ▶ Major construction infrastructure areas

Objectives of the Air Quality Survey

The general objective of air quality baseline is to collect data on air quality in the airshed, particularly the area that is likely to be affected by the project in order to develop baseline air quality and do mitigation planning.

Specific objectives of the sampling are:

1. Measurement of the current pollutant levels in ambient air in areas which will not (or insignificantly) be affected by existing sources of emission;
2. Measurement of the current pollutant levels at the community receptors; and
3. Measurement of the impact of the existing sources (traffic, fuel wood burning on air quality).

The following pollutants are selected for evaluation based on the expected emissions from the planned operations and the level of risk to human health posed by these pollutants:

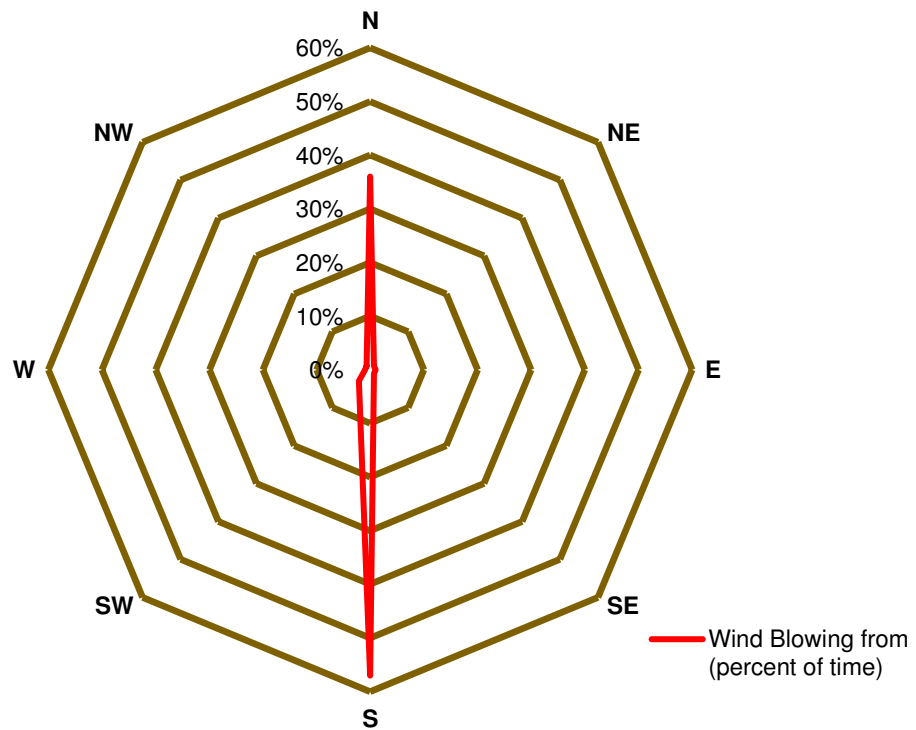
- ▶ Sulfur dioxide (SO₂)
- ▶ Nitrogen oxides (NO_x)
- ▶ Respirable particulate matter (PM₁₀ and PM_{2.5})

Ambient air quality measurements will be compared against applicable NEQS and international standards such as IFC and WHO standards.

Selection of Sites

Intermittent wind data from the Murree weather station is available between 2006 and 2015 (see **Exhibit B.4**). It indicates that most winds blow towards the south and northwest.

Exhibit B.4: Wind Rose of 20 Year Data from Balakot Weather Station (1996 – 2016)



A portable weather meter will be used on site to measure local weather conditions during the monitoring period. **Exhibit B.5** provides sample location and rationale for selection. The locations are mapped in **Exhibit B.3**.

Exhibit B.5: Proposed Air Quality Sampling Locations

<i>Sample ID</i>	<i>Coordinates</i>	<i>Parameters</i>	<i>Notes and Justification</i>
A1	34° 39' 45.267" N 73° 27' 39.969" E	NO _x , SO ₂ , PM ₁₀ and PM _{2.5}	Paras, near main road and labour camps. People at Paras village, affected by construction camp and activities.
A2	34° 39' 00.988" N 73° 26' 30.752" E	NO _x , SO ₂ , PM ₁₀ and PM _{2.5}	Construction sites and camps at dam site.
A3	34° 36' 18.025" N 73° 22' 57.917" E	NO _x , SO ₂ , PM ₁₀ and PM _{2.5}	Construction sites and camps at powerhouse site.
A4	34° 32' 57.594" N 73° 21' 16.815" E	NO _x , SO ₂ , PM ₁₀ and PM _{2.5}	People in Balakot town, affected by construction traffic.

Note: Actual locations will vary slightly based on site conditions

B.3.1 Equipment and Methods

The following materials and equipment will be utilized:

- ▶ Passive diffusion tubes
- ▶ Low volume air sampler
- ▶ Particulate matter forms (see **B.9, Survey Forms**)

The method, duration of sampling and lab for analysis is given in **Exhibit B.6**.

Exhibit B.6: Air Quality Sampling Equipment and Parameters

<i>Parameter</i>	<i>Equipment</i>	<i>Duration of Sampling</i>	<i>Expected Lab for Analysis</i>
NO _x , and NO ₂	Passive Diffusion Tubes	2-3 Weeks	Gradko Lab, UK
SO ₂	Passive Diffusion Tubes	2-3 Weeks	Gradko Lab, UK
PM ₁₀	Low Volume Sampler	24 Hours	HBP Lab
PM _{2.5}	Low Volume Sampler	24 Hours	HBP Lab

Quality Assurance and Quality Control

The following QA/QC measures will be implemented during the survey:

- ▶ A blank and a duplicate passive diffusion tube will be sent for analysis for each parameter
- ▶ Defined sampling protocol will be used

Fixing Diffusion Tubes.

- ▶ Select erecting points, preferable a place good air flow around the tube, for example, a branch of a small tree.

- ▶ Holds the tubes 5 or 6 cm out from the face of whatever structure they are attached to they will be fine. This is to ensure good air flow around the tube.
- ▶ Ensure that the tube is out of access of children
- ▶ Ensure safety by requesting a local resident to look after if the tube fixing is come to the notice of the locals, others wise not required.

B.4 Noise

The noise baseline surveys will be conducted to document the ambient noise levels in Study Area in a manner that can be used for the assessment of the noise impact of the proposed Project on sensitive receptors.

Ambient noise levels will be recorded at six locations for 24 hours duration at each location. Sampling locations are selected largely on the basis of possibly affected receptors in relation to indicative Project location (see **Exhibit B.1**). Additional details on the justification of each selected sampling site is provided in **Exhibit B.7**. The sampling sites are mapped in **Exhibit B.3**.

Exhibit B.7: Proposed Noise Sampling Locations

<i>Sample ID</i>	<i>Coordinates</i>	<i>Duration</i>	<i>Notes and Justification</i>
N1	34° 39' 41.489" N 73° 27' 39.018" E	24-hour	Noise levels far from river and near to labour camps.
N2	34° 36' 09.775" N 73° 22' 42.885" E	24-hour	Baseline noise levels near houses of Nalla village.
N3	34° 34' 54.877" N 73° 22' 10.274" E	24-hour	Near construction site, camps and Sangar village.
N4	34° 32' 41.626" N 73° 20' 55.317" E	24-hour	Baseline traffic noise levels on main road (Balakot).

Note: Actual locations will vary slightly based on site conditions

B.4.1 Equipment and Methods

Cirrus Research plc.'s sound level meter, Model CR: 1720 will be used for recording noise levels. The instrument meets the International standards IEC 61672-1:2002, IEC 660651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986, ANSI S1.43-1997 where applicable. The instrument has a resolution of 0.1 dB.

A calibrator will be used to ensure calibration of the instrument every time before use. A wind shield will be used for all measurements. Measurements will be for a continuous 24 hour period.

The following materials and equipment will be utilized:

- ▶ Noise Meter

- ▶ Tripod
- ▶ Calibrator
- ▶ Wind Shield
- ▶ Noise Survey Form (see **B.9**, *Survey Forms*)

B.4.2 Quality Assurance and Quality Control

The following QA/QC measures will be implemented during the survey:

- ▶ A person will be present during the entire reading period to make sure that nothing interferes with readings.
- ▶ Data will be transferred to a computer at the end of each reading period to check for any anomalies and issues
- ▶ Audio recording will be activated for readings above 70 dB so that the source can be identified.
- ▶ A tripod and wind shield will be used during noise measurements
- ▶ Measurement location will be 1.5 m above the ground and no closer than 3 m from any reflecting surfaces (e.g. wall) as per IFC guidelines.

B.5 Traffic

The baseline traffic survey will be undertaken to evaluate the current traffic conditions on the routes that could be used for project related transportation of goods and services during construction and operation. The road route connecting the project site to Islamabad forms the “Transport Corridor” of the Project.

The Transport Corridor will run along:

1. National Highway N-5 from Islamabad to Hassan Abdal
2. National Highway N-35 from Hassan Abdal to Mansehra
3. National Highway N-15 from Mansehra to Balakot and onward to Paras

The traffic counts will be conducted only at the route N-15 as all the project facilities are located along this route. The details of selection of each sampling location is given in **Exhibit B.8** and shown in **Exhibit B.3**. At each sampling site (**Exhibit B.3**), one person will be stationed to count the traffic in both directions. The traffic survey form (see **B.9**, *Survey Forms*) will be utilized in this.

Exhibit B.8: Proposed Traffic Count Locations

<i>Sample ID</i>	<i>Coordinates</i>	<i>Notes and Justification</i>
T1	34° 39' 38.415" N 73° 28' 00.367" E	Pre-project traffic baseline at Paras.
T2	34° 36' 04.402" N 73° 22' 41.576" E	Pre-project traffic baseline prior to entry to powerhouse site.

<i>Sample ID</i>	<i>Coordinates</i>	<i>Notes and Justification</i>
T3	34° 33' 00.219" N 73° 21' 06.837" E	Traffic baseline at market place at Balakot.
T4	34° 32' 41.690" N 73° 20' 55.277" E	Pre-project traffic baseline at Balakot.

Note: Actual locations will vary slightly based on site conditions

B.6 Water Quality

A baseline survey will be carried out to establish the river water quality within the Study Area. Water quality sampling for lab analysis will be carried in the Study Area. On-site water quality testing will be carried out alongside the water quality sampling.

Exhibit B.9 describes the sample locations and rationale for their selection. The proposed locations for sampling are shown in **Exhibit B.10**. **Exhibit B.11** details the water quality parameters that will be tested.

Exhibit B.9: Proposed Water Quality Sampling Locations

<i>ID</i>	<i>Coordinates</i>	<i>Description</i>	<i>Parameters</i>
W1	34°39'53.08" N 73°27'42.02" E	Near reservoir	On site testing
W2	34°37'56.53" N 73°25'43.54" E	On Kawai Nullah, a tributary of Kunhar River	On site testing
W3	34°37'17.46" N 73°24'9.29" E	Downstream of dam	On site testing and lab analysis
W4	34°34'53.07" N 73°21'25.18" E	Upstream of Balakot and downstream of tailrace	On site testing
W5	34°31'41.77" N 73°20'52.73" E	Downstream of Balakot	On site testing

Note: Actual locations will vary slightly based on site conditions

Exhibit B.10: Proposed Water Quality Sampling Locations

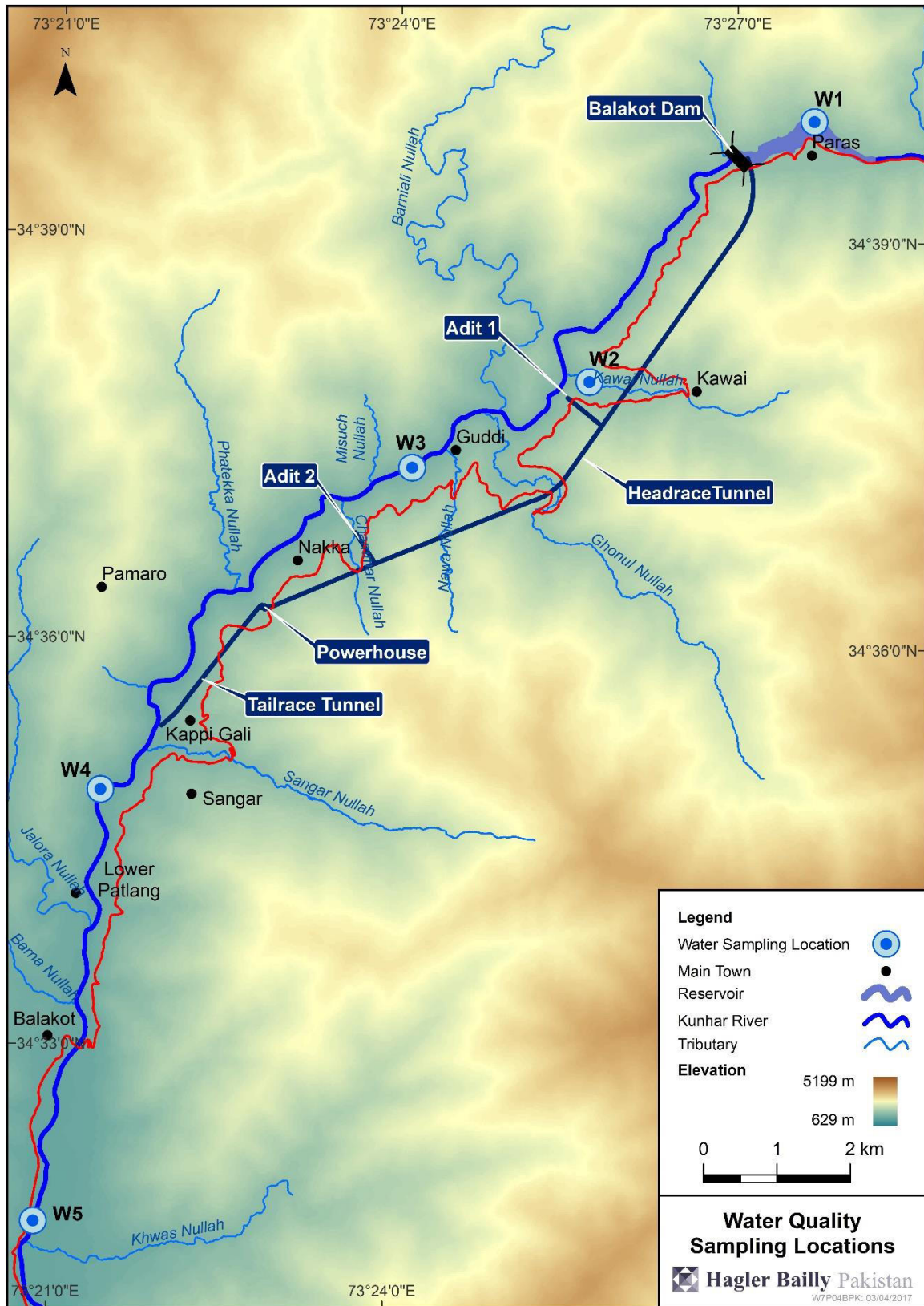


Exhibit B.11: Water Quality Testing Parameters

<i>Parameters</i>	<i>Lab</i>
On-site testing:	
pH, electrical conductivity (EC), dissolved oxygen (DO), temperature	HBP Personnel (on site)
Lab analysis:	
General: turbidity, total suspended solids (TSS), total dissolved solids (TDS), hardness, pH, EC, BOD ₅ , COD, alkalinity (as CaCO ₃)	Sampling and analysis will be carried out by HBP.
Major ions: Na, Ca, K, SO ₄ , Cl, F, NO ₃ , CO ₃ ²⁻ /HCO ₃ ⁻	
Metals (Total): Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Selenium, Silver, Tin, Zinc	
Biological: Suite of tests (total colony count, total coliforms, fecal E. Coli, Fecal Streptococci/Enterococci)	Aga Khan University Hospital Clinical Laboratories

Equipment and Methods

The following materials and equipment will be utilized:

- ▶ Field water quality testing meters (pH, electrical conductivity, dissolved oxygen, temperature)
- ▶ Water sampling containers
- ▶ Field parameters record form
- ▶ Packing and handling materials
- ▶ Water Quality Survey Forms (see **B.9**, *Survey Forms*)

Quality Assurance and Quality Control

- ▶ Quality Control (QC) samples will include:
 - ▷ 1 trip blank
 - ▷ 1 field duplicate

The complete analytical suite² of EPA approved methodologies that will be used is listed in **Exhibit B.12**. The parameters that will be analyzed will depend on the concerns associated with the water sample. These will be selected before submission of the samples for testing.

² Selected based on National Standards for Drinking Water Quality, National Environmental Quality Standards for Municipal and Liquid Industrial Effluents and Previous similar studies in the region.

Exhibit B.12: Method References for Water Quality Parameters

<i>Parameter</i>	<i>Analytical Method (Expected)</i>	<i>Unit</i>	<i>Minimum Detection Limit</i>
General (11 Parameters)			
Temperature	Field test	°C	-5.0
pH	Field test US EPA 150.1	na	0.01
Electrical Conductivity	Field test APHA 2510 B	µS/cm	1
Dissolved Oxygen	Field test	mg/l	0.01
TDS	APHA 2540 C	mg/l	10.0
TSS	APHA 2540 D	mg/l	4.0
Turbidity	HACH 8237	FAU	0
Alkalinity as CaCO ₃	APHA 2320 B	mg/l	1.0
Hardness as CaCO ₃	APHA 2340 B	mg/l	1.0
BOD ₅	US EPA 405.1	mg/l	5.0
COD	US EPA 410.2	mg/l	4.0
Major Ions (8 parameters)			
Sodium	APHA 3120 B	mg/l	0.1
Calcium	APHA 3120 B	mg/l	0.1
Potassium	APHA 3120 B	mg/l	0.1
Sulfate	APHA 4500-SO42- E	mg/l	1.0
Chloride	APHA 4500-Cl- E	mg/l	1.0
Fluoride	APHA 4500-F-C	mg/l	0.1
Carbonate/bicarbonate	APHA 2320 B	mg/l	1.0
Nitrate	APHA 4500-NO3- H	mg/l	0.01
Metals (18 Parameters)			
Antimony	ICP-OES	mg/l	0.05
Aluminum	ICP-OES	mg/l	0.001
Arsenic	ICP-OES	mg/l	0.001
Barium	ICP-OES	mg/l	0.001
Boron	ICP-OES	mg/l	0.001
Cadmium	ICP-OES	mg/l	0.001
Chromium	ICP-OES	mg/l	0.001
Copper	ICP-OES	mg/l	0.001

<i>Parameter</i>	<i>Analytical Method (Expected)</i>	<i>Unit</i>	<i>Minimum Detection Limit</i>
Iron	ICP-OES	mg/l	0.01
Lead	ICP-OES	mg/l	0.001
Magnesium	APHA 3120 B	mg/l	0.1
Manganese	ICP-OES	mg/l	0.001
Mercury	ICP-OES	mg/l	0.001
Nickel	ICP-OES	mg/l	0.001
Selenium	ICP-OES	mg/l	0.001
Silver	ICP-OES	mg/l	0.02
Tin	ICP-OES	mg/l	0.001
Zinc	ICP-OES	mg/l	0.01
Biological (4 parameters)			
Total Colony Count			
Total Coliforms	APHA 9221 B		< 2 MPN/100 ml
Fecal E.coli	APHA 9221 F		< 2 MPN/100 ml
Fecal Streptococci /Enterococci	APHA 9230 B		< 2 MPN/100 ml

B.7 Hydro-census

A groundwater well census will be carried out to map the water resources within the Study Area as springs may be impacted (drying and impact to water quality) due to tunnel boring which. Hydro-census Study Area is shown in **Exhibit B.13**.

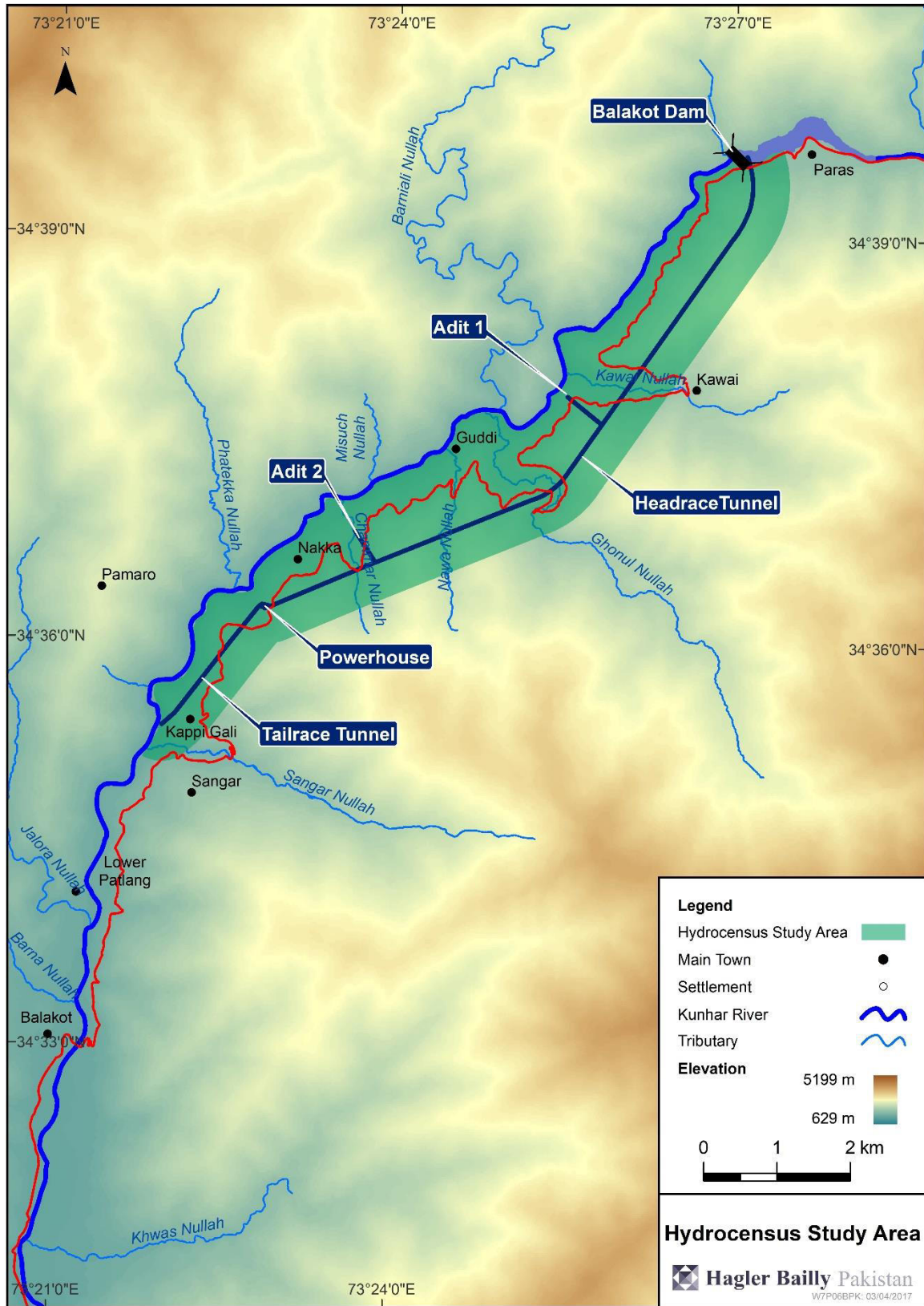
Equipment and materials:

The following equipment will be required

Measuring tape

Hydro-census form (see **B.9, Survey Forms**)

Exhibit B.13: Hydro-census Study Area



B.8 Team and Timeline

This section presents the responsibilities (**Exhibit B.14**) for the various components of the proposed field survey.

Exhibit B.14: Team and Responsibilities

<i>Name</i>	<i>Responsibility</i>	<i>Advisor</i>
Hassan Bukhari	Survey Methodology and Plan	Aziz Karim
Hassan Bukhari	Visual Survey	Hidayat Hasan
	Air Quality Survey	
	Noise Survey	
	Traffic Survey	
Saeed Nawaz	Water Quality Sampling	Aziz Karim
	Hydro-census	
Waris Ali	Field Support	
Khalil Ejaz Awan	Logistics	

B.9 Survey Forms

Survey forms are as follows:

Visual Survey Form

Location ID: _____

Village Name: _____

Location description: _____

	<i>Coordinates</i>		<i>Marked on Map (Y/N)</i>	<i>Picture IDs</i>			<i>Comments</i>
	<i>Northing</i>	<i>Easting</i>		<i>Mid-point direction</i>	<i>Bearing left</i>	<i>Bearing right</i>	
Location 1							
Location 2							
Location 3							
Location 4							

Noise Monitoring Form

Location		Latitude		Longitude	
Date	dd/mm/yy	Monitoring Period		Start Time	_____
				End Time	_____
Weather Condition			Wind Speed and Direction		
Name and Model of Device					
Calibration Date and Method	(dd/mm/yy and method)				
Picture ID					
Name of Field Operator:					
Wind Shield	y/n	Tripod	y/n	Distance from: ground	m
				Nearest reflector	m

Details of barriers between noise source and monitoring location; details of reflective surfaces near monitoring device.

Name/Type	Height (meters)	Length (meters)	Width (meters)	Location (with respect to both, noise source and sound meter)	Picture ID

Additional Verified Sources of Noise during the Monitoring Period

No	Name of Source	Distance from the monitoring device	Direction from the monitoring device
1			
2			
3			
4			

Additional Comments:

Traffic Survey Form

Location		Direction																							
Date	MM/DD/YY	Time: From								HH : MM	am/pm	To	HH : MM								am/pm				
Cars																									
Pick-ups																									
Bikes																									
Buses																									
Trucks	Truck (2 Axle)																								
	Truck (3 Axle)																								
	Truck (4 Axle)																								
	Truck (5 Axle)																								
	Truck (6 Axle)																								
Tractor																									
Trailer																									
Others																									

Water Quality Survey Form

SR	ID	Date	Time	Location	Coordinates		Field Testing parameters				Lab	Comments
					N	E	pH	Temp	EC	DO		
1												
2												
3												
4												
5												
6												
7												

Appendix C: Soil Quality

See following pages.

CERTIFICATE OF ANALYSIS

Work Order : KL1705008 Client : HAGLER BAILLY PAKISTAN Contact : MR. Asif Mahmood Address : Block 1, Commercial Area, Street 21, F8/2 Islamabad Pakistan 44000 E-mail : AMahmood@haglerbailly.com.pk Telephone : ---- Facsimile : ---- Project : ---- Order number : ---- C-O-C number : 19496 Sampler : SAEED NAWAZ Site : ---- Quote number : QT35828 - SOIL (METALS)	Page : 1 of 3 Laboratory : ALS Technichem (M) Sdn. Bhd. Contact : NURUL AINA Address : WISMA ALS, 21, Jalan Astaka U8/84, Bukit Jelutong Shah Alam Selangor Malaysia 40150 E-mail : Nurul.Aina@alsglobal.com Telephone : +603 7845 8257 Facsimile : +603 7845 8258 QC Level : ALS Malaysia Standard Quality Schedule Date Samples Received : 28-Apr-2017 18:00 Date Analysis Commenced : 03-May-2017 Issue Date : 12-May-2017 17:34 No. of samples received : 4 No. of samples analysed : 4
---	---

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



Signatories

This laboratory is accredited under STANDARDS MALAYSIA. The tests reported herein have been performed in accordance with laboratory's Terms of Accreditation. This document has been electronically signed by authorized signatories indicated below. Electronic signing has been carried out in compliance with procedure specified in 21 CFR Part 11.

Signatories

Norain Yahya

Position

Chemist (IKM No: M/4233/7042/15)



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, ASTM, NIOSH and BS EN. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

∅ = ALS is not accredited for these tests.

~ = Indicates an estimated value.

- ALS TECHNICHEM prepares this Test Report based on the tests requested and on the specific sample(s) submitted for analysis. The significance of this Report is subject to the adequacy and representative character of the sample(s) and to the comprehensiveness of the tests requested or made. ALS TECHNICHEM assumes no responsibility for variations in quality or other characteristic of the product produced or supplied under conditions over which ALS TECHNICHEM has no control.
ALS TECHNICHEM acts for the customer from whom the instructions to act have originated. No other party is entitled to give instructions, particularly on the scope of analysis or delivery of report or certificate, unless so authorized by the customer.
- ALS TECHNICHEM undertakes to exercise due care and skill in the performance of its analytical and consultancy services but no warranties are given and none may be implied directly or indirectly relating to ALS TECHNICHEM's test results, services or facilities. In no event shall ALS TECHNICHEM be liable to collateral, special or consequential damage.
- **ND : Recovery not determined, background level >= 4x spike level**



Analytical Results

Sub-Matrix: **SOIL**

				Client sample ID	S-1	S-2	S-3	S-4	----
				Sampling date/time	13-Apr-2017 08:20	13-Apr-2017 10:35	13-Apr-2017 11:50	13-Apr-2017 12:50	----
Compound	Method	LOR	Unit		KL1705008-001	KL1705008-002	KL1705008-003	KL1705008-004	-----
Inorganic and Nonmetallic Properties									
☐ Nitrate as N (Sol.)	APHA4500-NO3-H	0.1	mg/kg		11.6	<0.1	<0.1	1.8	----
☐ Phosphate as P	APHA4500-P-F	1	mg/kg		<1	<1	<1	<1	----
Metals and Major Cations - Total									
Arsenic	USEPA6010B	1	mg/kg		8	4	6	4	----
Barium	USEPA6010B	5	mg/kg		152	54	50	61	----
Boron	USEPA6010B	5	mg/kg		<5	<5	<5	<5	----
Cadmium	USEPA6010B	1	mg/kg		<1	<1	<1	<1	----
Chromium	USEPA6010B	1	mg/kg		43	25	56	17	----
Copper	USEPA6010B	1	mg/kg		34	19	28	23	----
Iron	USEPA6010B	1	mg/kg		25100	14200	22600	11000	----
Lead	USEPA6010B	1	mg/kg		17	12	16	16	----
Manganese	USEPA6010B	1	mg/kg		501	710	798	770	----
Mercury	USEPA7471A	0.1	mg/kg		<0.10	<0.10	<0.10	<0.10	----
Nickel	USEPA6010B	1	mg/kg		54	37	88	20	----
Potassium	USEPA6010B	5	mg/kg		2220	609	908	1040	----
Selenium	USEPA6010B	5	mg/kg		<5	<5	<5	<5	----
Silver	USEPA6010B	1	mg/kg		<1	<1	<1	<1	----
Zinc	USEPA6010B	1	mg/kg		78	38	72	58	----

QUALITY CONTROL REPORT

Work Order	: KL1705008	Page	: 1 of 5
Client	: HAGLER BAILLY PAKISTAN	Laboratory	: ALS Technichem (M) Sdn. Bhd.
Contact	: MR. Asif Mahmood	Contact	: NURUL AINA
Address	: Block 1, Commercial Area, Street 21, F8/2 Islamabad Pakistan 44000	Address	: WISMA ALS, 21, Jalan Astaka U8/84, Bukit Jelutong Shah Alam Selangor Malaysia 40150
E-mail	: AMahmood@haglerbailly.com.pk	E-mail	: Nurul.Aina@alsglobal.com
Telephone	: ----	Telephone	: +603 7845 8257
Facsimile	: ----	Facsimile	: +603 7845 8258
Project	: ----	QC Level	: ALS Malaysia Standard Quality Schedule
Order number	: ----	Date Samples Received	: 28-Apr-2017
C-O-C number	: 19496	Date Analysis Commenced	: 03-May-2017
Sampler	: SAEED NAWAZ	Issue Date	: 12-May-2017
Site	: ----	No. of samples received	: 4
Quote number	: QT35828 - SOIL (METALS)	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



Signatories

This laboratory is accredited under STANDARDS MALAYSIA. The tests reported herein have been performed in accordance with laboratory's Terms of Accreditation. This document has been electronically signed by authorized signatories indicated below. Electronic signing has been carried out in compliance with procedure specified in 21 CFR Part 11.

Signatories

Position

Norain Yahya

Chemist (IKM No: M/4233/7042/15)



General Comments

The analytical procedures used by ALS Malaysia have been developed from established internationally recognized procedures. In-house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :

- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC
- CFU = Colony Forming Unit
- MPN = Most Probable Number
- PN = Probable Number
- Result <LOR = Not Detected (ND)



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method SOP-23 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
Metals and Major Cations - Total : USEPA6010B / Determination of Total Metals by ICP-OES									
KL1704953-001	Anonymous	Arsenic	7440-38-2	1	mg/kg	53	54	3.18	0% - 20%
		Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		Chromium	7440-47-3	1	mg/kg	39	40	0.00	0% - 20%
		Copper	7440-50-8	1	mg/kg	42	43	0.00	0% - 20%
		Lead	7439-92-1	1	mg/kg	29	28	0.00	0% - 20%
		Nickel	7440-02-0	1	mg/kg	6	6	0.00	No Limit
		Selenium	7782-49-2	5	mg/kg	<5	<5	0.00	No Limit
		Silver	7440-22-4	1	mg/kg	<1	<1	0.00	No Limit
		Zinc	7440-66-6	1	mg/kg	197	202	2.50	0% - 20%
		Boron	7440-42-8	5	mg/kg	21	22	5.95	No Limit
		Barium	7440-39-3	5	mg/kg	34	35	0.00	No Limit
		Iron	7439-89-6	1	mg/kg	23300	26800	13.9	0% - 20%
		Potassium	7440-09-7	5	mg/kg	196	199	1.54	0% - 20%
Manganese	7439-96-5	1	mg/kg	370	378	2.29	0% - 20%		
Metals and Major Cations - Total : USEPA7471A / Determination of Mercury by FIMS									
KL1704953-001	Anonymous	Mercury	7439-97-6	0.5	mg/kg	0.14	0.14	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
Metals and Major Cations - Total : USEPA6010B/Determination of Total Metals by ICP-OES									
Arsenic	7440-38-2	1	mg/kg	<1	50 mg/kg	98.1	80	120	
Cadmium	7440-43-9	1	mg/kg	<1	50 mg/kg	104	80	120	
Chromium	7440-47-3	1	mg/kg	<1	50 mg/kg	107	80	120	
Copper	7440-50-8	1	mg/kg	<1	50 mg/kg	106	80	120	
Lead	7439-92-1	1	mg/kg	<1	50 mg/kg	107	80	120	
Nickel	7440-02-0	1	mg/kg	<1	50 mg/kg	106	80	120	
Selenium	7782-49-2	5	mg/kg	<5	50 mg/kg	81.4	80	120	
Silver	7440-22-4	1	mg/kg	<1	50 mg/kg	103	80	120	
Zinc	7440-66-6	1	mg/kg	<1	50 mg/kg	107	80	120	
Boron	7440-42-8	5	mg/kg	<5	50 mg/kg	109	80	120	
Barium	7440-39-3	5	mg/kg	<5	50 mg/kg	105	80	120	
Iron	7439-89-6	1	mg/kg	<1	50 mg/kg	91.8	80	120	
Potassium	7440-09-7	5	mg/kg	<5	50 mg/kg	99.5	80	120	
Manganese	7439-96-5	1	mg/kg	<1	50 mg/kg	108	80	120	
Metals and Major Cations - Total : USEPA7471A/Determination of Mercury by FIMS									
Mercury	7439-97-6	0.5	mg/kg	<0.50	0.2 mg/kg	110	80	120	

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
Metals and Major Cations - Total : USEPA6010B/Determination of Total Metals by ICP-OES							
KL1704953-002	Anonymous	Barium	7440-39-3	50 mg/kg	106	80	120
		Boron	7440-42-8	50 mg/kg	104	80	120
		Cadmium	7440-43-9	50 mg/kg	99.6	80	120
		Chromium	7440-47-3	50 mg/kg	105	80	120
		Copper	7440-50-8	50 mg/kg	110	80	120
		Iron	7439-89-6	50 mg/kg	# Not Determined	80	120
		Lead	7439-92-1	50 mg/kg	101	80	120
		Manganese	7439-96-5	50 mg/kg	82.9	80	120



Sub-Matrix: **SOIL**

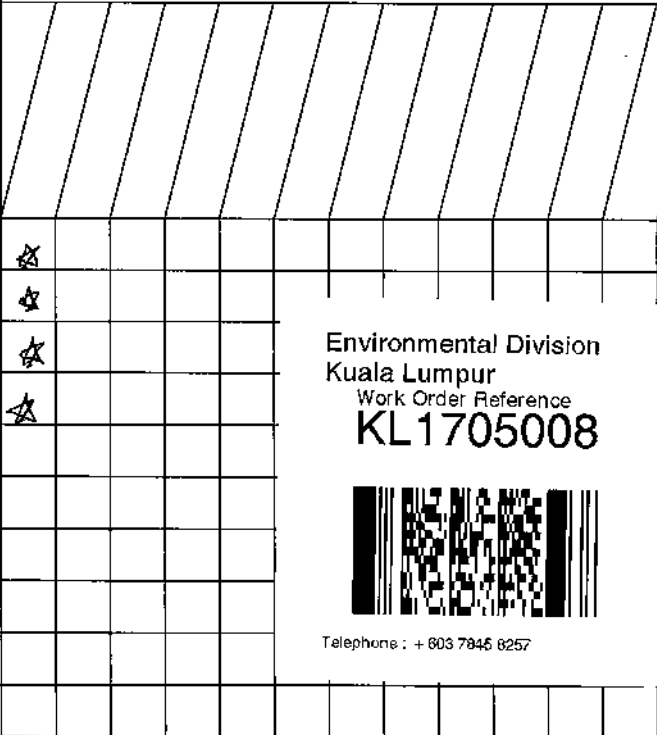
				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Recovery Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
Metals and Major Cations - Total : USEPA6010B/Determination of Total Metals by ICP-OES - continued							
KL1704953-002	Anonymous	Nickel	7440-02-0	50 mg/kg	103	80	120
		Potassium	7440-09-7	50 mg/kg	101	80	120
		Silver	7440-22-4	50 mg/kg	98.1	80	120
		Zinc	7440-66-6	50 mg/kg	92.9	80	120
KL1704953-002	Anonymous	Arsenic	7440-38-2	50 mg/kg	99.6	80	120
		Selenium	7782-49-2	50 mg/kg	82.8	80	120
Metals and Major Cations - Total : USEPA7471A/Determination of Mercury by FIMS							
KL1704953-002	Anonymous	Mercury	7439-97-6	0.2 mg/kg	108	80	120



ALS TECHNICHEM (M) SDN BHD (117964-P)
 No. 9, Jalan Astaka U8/84,
 Seksyen U8, Bukit Jelutong,
 40150 Shah Alam, Selangor Darul Ehsan.
 Tel: (603) 7845 8257 Fax: (603) 7845 8258

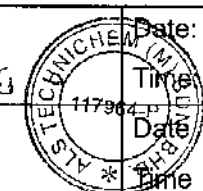
CHAIN OF CUSTODY RECORD

No. 19496

COMPANY: <i>Hagler Bailly Pakistan</i>		PROJECT: <i>BPK</i>		PURCHASE ORDER NO.:			
POSTAL ADDRESS: <i>Block 1, Commercial Area, Street 21</i>				FOR LAB USE ONLY			
<i>F 8/2, Islamabad</i>				LAB BATCH NO.:			
PHONE: <i>92 51 28 57 200-7</i> FAX: <i>92 51 28 57 208-9</i>				NO OF SAMPLES:			
SEND REPORT TO: <i>Asif Mahmood / Aziz Karim / Hidayat Hasan</i>				ANALYSIS REQUIRED 			
SEND INVOICE TO: <i>Humayun Manzoor</i>							
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	REMARKS	
<i>S-1</i>	<i>Soil</i>	<i>13/4/17</i>	<i>08:20</i>	<i>(1x300g Glass)</i>	<i>01</i>	<i>*</i>	<i>Please see</i>
<i>S-2</i>	<i>"</i>	<i>"</i>	<i>10:35</i>	<i>"</i>	<i>01</i>	<i>*</i>	<i>below Comments</i>
<i>S-3</i>	<i>"</i>	<i>"</i>	<i>11:50</i>	<i>"</i>	<i>01</i>	<i>*</i>	
<i>S-4</i>	<i>"</i>	<i>"</i>	<i>12:50</i>	<i>"</i>	<i>01</i>	<i>*</i>	
Sampled by: <i>Saeed Nawar</i>		Shipped Via: <i>Fed Ex</i>		Consignment No.:			
Relinquished by: <i>Saeed Nawar</i>		Date: <i>24/4/17</i>		Received by: <i>masouki</i>		COMMENTS / SPECIAL HANDLING <i>* Analyze as per attached list</i>	
Print Name		Time:		Date: <i>28/4/2017</i>			
Relinquished by:		Date:		Received by:			
Print Name		Time:		Print Name			
Received by Lab:		Date:		Container Type & Preservatives Codes: P=Plastic; G=Glass; V=Vial; J=Jar; HN=Nitric acid preserved; HC=Hydrochloric acid preserved; HS=Sulfuric acid preserved; ST=Sterile bottle; B=Sodium hydroxide preserved; Z=Zinc acetate preserved; E=EDTA preserved.			
Print Name		Time:					

Environmental Division
 Kuala Lumpur
 Work Order Reference
KL1705008

 Telephone : + 603 7845 8257



Parameters List

Arsenic

Barium

Boron

Cadmium

Chromium

Copper

Iron

Lead

Manganese

Nickel

Selenium

Silver

Zinc

Mercury

PO₄ (P)

NO₃ (N)

Potassium (K)



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: Soil
Sampling Coordinates: 34 39 38.3, 73 27 42.5
Project: BPK
Sample ID: S-1
Sample Collected From: Agricultural Land, Paras
Sampling Date: April 13, 2017
Sampling Time: 08:30
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>Minimum Detection Limit</i>	<i>Analysis Results</i>
pH	CSSS		0.10	8.14
EC	CSSS	µS/cm	1.00	233.00
Organic Matter	CSSS	%	0.10	2.86
Organic Carbon	CSSS	%	0.05	1.64

CSSS: Canadian Society of the Soil Science

µS/cm: Microsiemens Per Centimeter

EC: Electrical Conductivity

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: Soil
Sampling Coordinates: 34 38 50.4, 73 26 28.9
Project: BPK
Sample ID: S-2
Sample Collected From: Pine Forest, Dam Site
Sampling Date: April 13, 2017
Sampling Time: 10:30
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>Minimum Detection Limit</i>	<i>Analysis Results</i>
pH	CSSS		0.10	8.10
EC	CSSS	µS/cm	1.00	474.00
Organic Matter	CSSS	%	0.10	2.69
Organic Carbon	CSSS	%	0.05	1.55

CSSS: Canadian Society of the Soil Science

µS/cm: Microsiemens Per Centimeter

EC: Electrical Conductivity

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: Soil
Sampling Coordinates: 34 36 13.5, 73 22 51.8
Project: BPK
Sample ID: S-3
Sample Collected From: Scrub Forest, Power house Site
Sampling Date: April 13, 2017
Sampling Time: 11:50
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>Minimum Detection Limit</i>	<i>Analysis Results</i>
pH	CSSS		0.10	7.85
EC	CSSS	µS/cm	1.00	377.00
Organic Matter	CSSS	%	0.10	5.46
Organic Carbon	CSSS	%	0.05	3.13

CSSS: Canadian Society of the Soil Science

µS/cm: Microsiemens Per Centimeter

EC: Electrical Conductivity

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: Soil
Sampling Coordinates: 34 34 54.9, 73 22 07.7
Project: BPK
Sample ID: S-4
Sample Collected From: Agricultural Land, Sangar
Sampling Date: April 13, 2017
Sampling Time: 12:50
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>Minimum Detection Limit</i>	<i>Analysis Results</i>
pH	CSSS		0.10	7.90
EC	CSSS	µS/cm	1.00	258.00
Organic Matter	CSSS	%	0.10	3.72
Organic Carbon	CSSS	%	0.05	2.13

CSSS: Canadian Society of the Soil Science

µS/cm: Microsiemens Per Centimeter

EC: Electrical Conductivity

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services

Appendix D: Hydro-census Field Data

See following pages.

Exhibit D.1: Hydro-census Field Data

ID	Date	Time	Latitude	Longitude	Altitude (m)	Village	Owner	Temp (°C)	pH	Conductivity (µs/cm)	Human Drinking	Human Other Use	Livestock use	Livestock	Total Households	Water Use per HH (Liters)	Active From	Extraction Method	Comments
S-5	4/12/17	1135	34.62989	73.42936	1358	Kawai	Mahmood Shah	16	7.5	472	Yes	Yes	Yes	150	30	900	1916	Pipe and Manual	10 pipes (0.5-inch diameter) installed on spring (water tanks), flow remains constant through year. Above 100 years old spring.
S-6	4/12/17	1210	34.64386	73.43882	1392	Kawai	Syed Qasim Shah	14	8.4	378	Yes	Yes	No	–	16	50	1916	Manual	Water use for vehicle washing, flow remains constant through year.
S-7	4/12/17	1230	34.64834	73.44213	1438	Kawai	Rafique Shah	16	8.4	386	Yes	Yes	No	–	6	50	1916	Manual	Water use for vehicle washing, flow remains constant through year. Spring is 100 meters away, couldn't reach spring due to non-availability of walking track.
S-8	4/12/17	1315	34.65027	73.4435	1432	Kawai	Syed Abdul Sattar Shah	17	8.4	385	Yes	Yes	No	–	5	50	1916	Manual	Water use for vehicles washing, spring is 150 meters away, due to sliding & non-availability of walking track couldn't reach at spring
S-9	4/12/17	1330	34.65137	73.44383	1388	Kawai	Syed Abdul Sattar Shah	16	8.3	348	No	No	No	–	–	–	1965	Manual	No one using spring water
S-10	4/12/17	1345	34.6533	73.4456	1370	Kawai	Syed Ghulam Muhammad Shah	16	8.3	315	Yes	Yes	No	–	50	20	1997	Manual	Water uses only in Ramadhan, flow decreases up to 30% in winter
S-11	4/12/17	1400	34.6534	73.4462	1380	Kawai	Syed Ghulam Muhammad Shah	15	8.3	333	Yes	Yes	No	–	100	100	1947	Manual	Water uses for vehicle washing and flow remain constant through year. Spring is 50 meters away, due to non-availability of walking track couldn't reach at spring.
S-12	4/12/17	14:20	34.6556	73.4459	1372	Paras	Noor Hussain Shah	16	8.2	395	Yes	Yes	No	–	500	20	1967	Pipe and Manual	Pipeline installed in 2014 for water supply for boy's high school Paras. Flow decreases 50% in winter.
S-13	4/12/17	1630	34.62671	73.42209	1272	Domaniyan	Iqbal Khan	16	7.9	338	Yes	Yes	Yes	10	5	100	1972	Manual	Water reduces 50% in winter
S-14	4/13/17	1345	34.59344	73.3725	1355	Kappi Gali	Khalid Khan	18	8.2	362	Yes	Yes	Yes	3	30	300	1816	Manual	Spring is more than 200 years old, water remain constant through year.
S-15	4/13/17	1510	34.62139	73.43033	1807	Thawan	Feroz / Ghulam Qadir	14	7.8	466	Yes	Yes	Yes	140	40	200	1916	Manual	Spring is more than 100 years old, spring dry in 2005 earth quake & in 2007 again active. 100 houses in Thawan, including these 40 houses and all are using another water supply scheme coming from Aar 7 km from This village.
S-17	4/13/17	1700	34.61655	73.4216	1607	Ghonul	Liaqat Ali	17	8.0	460	No	Yes	No	–	2	50	1916	Manual	Water use for vehicle washing, flow reduces 50% in winter.
S-18	4/13/17	1715	34.61728	73.42434	1459	Ghonul	Saeed	18	8.4	345	No	Yes	No	–	4	50	1956	Manual	Water use for vehicle washing, spring in above 50 years old, and water flow reduces 50% in winter.
S-19	4/13/17	1730	34.61824	73.42588	1376	Ghonul	Noor ur Rehman	15	8.5	384	Yes	No	No	–	1	200	1965	Pipe	Water flow reduces 50% in winter.
S-20	4/13/17	1745	34.6187	73.42561	1422	Ghonul	Noor ur Rehman	16	8.5	354	No	No	No	–	–	–	1965	Manual	No usage of water, flow reduces 50% in winter. Spring is more than 50 years old.
S-27	4/15/17	1300	34.62586	73.42572	1525	Dhamdhar	Mubarak ur Rehman	NA	NA	NA	No	No	No	–	–	–	1916	Manual	Dry spring in 2005 earth quake, due to dryness 25 house shifted in lower side. Active in rainy season.
S-29	4/15/17	1400	34.62505	73.42139	1364	Dhamdhar	Latif Khan	NA	NA	NA	Yes	Yes	Yes	7	1	500	2014	Pipe	Spring is 50 meter down side from road (from saved GPS coordinates). Non-availability of walking track, couldn't reach at Spring. Flow remain constant through year
S-30	4/15/17	1525	34.62594	73.42338	1382	Dhamdhar	Mubarak ur Rehman	21	8.3	313	No	No	No	–	–	–	1965	Manual	Dead flow spring, spring inactive from 2005 earth quake.
S-33	4/15/17	1655	34.61251	73.41356	1779	Riyan	Ilyas Riyan	12	8.0	261	Yes	Yes	Yes	120	25	300	1816	Manual	Spring is more than 200 years old, flow reduce to 30% in winter, Riyan have also a supply line coming from Baida 1 km away.

ID	Date	Time	Latitude	Longitude	Altitude (m)	Village	Owner	Temp (°C)	pH	Conductivity (µs/cm)	Human Drinking	Human Other Use	Livestock use	Livestock	Total Households	Water Use per HH (Liters)	Active From	Extraction Method	Comments
S-36	4/15/17	1825	34.61505	73.41434	1576	Jammu Nakka	Muhammad Miskeen	16	7.5	421	Yes	Yes	Yes	12	3	400	1916	Manual	Spring dry in May, active in March
S-37	4/15/17	1835	34.61523	73.41536	1562	Jammu Nakka	Ali Zaman	14	7.9	232	Yes	Yes	Yes	200	35	300	1816	Manual	Water flow remain constant through year. Spring is more than 200 years old.
S-38	4/15/17	1852	34.61843	73.41308	1530	Jammu Nakka	Noor ur Rehman	14	8.1	222	Yes	No	Yes	50	9	200	1865	Manual	Water flow constant through year, spring is more than 150 years old.
S-42	4/16/17	1210	34.61799	73.40511	1414	Darwesh abad	Sher Zaman	18	8.0	328	No	No	No	–	–	–	2000	Manual	Spring dry in winter and active in Mar. Spring is on road, no one is using this water.
S-43	4/16/17	1300	34.62106	73.40651	1277	Mankpai	Mubarak Rehman	17	8.4	312	Yes	Yes	Yes	40	12	350	1916	Pipe	Spring has constant flow, more than 100 years old spring. Another spring found near 15 meters from this spring.
S-44	4/16/17	1330	34.62104	73.40671	1181	Mankpai	Mubarak Rehman	17	8.4	316	Yes	Yes	Yes	10	3	200	1916	Manual	Flow remains constant, spring is more than 100 years old.
S-46	4/16/17	1627	34.60539	73.39392	1497	Khaulian	Haji Haroon	NA	NA	NA	No	No	Yes	–	–	–	NA	Manual	Spring active in May and dry in September. Spring is totally dry. Only animal drink this water.
S-47	4/16/17	1645	34.60527	73.39373	1538	Khaulian	Ali Zaman	18	8.2	247	Yes	Yes	Yes	20	1	1000	1916	Manual	Spring has constant flow; spring water uses for animals and in school (1000 children). Spring is more than 100 years old.
S-48	4/16/17	1700	34.6051	73.39443	1525	Khaulian	Haji Haroon	15	8.1	297	Yes	Yes	Yes	80	15	400	1916	Pipe	Spring is more than 100 years old. Water flow reduce 50% in winter.
S-49	4/16/17	1710	34.60545	73.39452	1486	Khaulian	Haji Haroon	16	8.2	328	Yes	Yes	Yes	60	10	300	1916	Pipe	Water flow reduces 50% in winter. Residents install pipeline on their own expense in 2007.
S-51	4/16/17	1800	34.60598	73.39659	1535	Mohri	Aziz	14	7.9	347	Yes	Yes	Yes	40	27	500	1866	Pipe and Manual	This spring is more than 150 years old, water reduce 50% in winter. This water is also supplying through pipeline to Khaulian (Cheeran wala Nakka)
S-52	4/16/17	1815	34.6064	73.39616	1496	Mohri	Aziz	14	8.3	235	Yes	Yes	Yes	90	50	500	1916	Pipe	The water of spring supplies through pipeline to 45 houses of Khaulian Darweshabad and 5 houses of Khaulian Cheeran wala Nakka. Flow reduces 50% in winter.
S-53	4/16/17	1830	34.60571	73.39442	1490	Khaulian	Mir Wali	15	8.2	293	Yes	No	Yes	150	60	500	1916	Pipe	The water of spring supplies to Nakka Sehal Lambi Pati village 3 km away. NGO installed pipeline in 2007. Flow reduce 50% in winter.
S-54	4/16/17	1840	34.6063	73.39452	1443	Khaulian	Yaqoob	14	8.4	278	Yes	Yes	Yes	10	4	200	1966	Manual	Flow reduces 50% in winter.
S-55	4/16/17	1845	34.60628	73.39457	1508	Khaulian	Yaqoob	13	7.8	328	Yes	Yes	Yes	90	45	400	1916	Pipe	This spring is second source of Khaulian Darweshabad 3 km away from spring. Flow reduce 50% in winter.
S-56	4/16/17	1856	34.60642	73.39488	1323	Khaulian	Miskeen	15	8.1	378	Yes	Yes	Yes	5	2	400	1916	Pipe	Spring is more than 100 years old. Water supplies to 1 house and 1 Jamia Mosque. Flow reduce 50% in winter.
S-57	4/17/17	1110	34.60695	73.39553	1440	Khaulian	Miskeen	14	8.1	344	No	No	Yes	–	–	–	1966	Manual	More than 50 years old spring, spring active from April to September, only animal drink this water, animal quantity is not confirming as spring is in hilly area.
S-58	4/17/17	1152	34.60707	73.39449	1371	Khaulian	Rasheed	17	7.6	505	Yes	Yes	No	–	1	1000	1916	Pipe	Spring water use in primary school (150 children) through pipeline installed by NGO in 2008. Water flow reduce 50% in winter.
S-59	4/17/17	1205	34.60704	73.39476	1443	Khaulian	Rasheed	16	8.0	336	Yes	Yes	No	–	1	500	1916	Pipe	Spring water use in hospital at Khaulian Darweshabad 500 meter away from spring. The pipeline funded by NGO in 2008. Water flow reduces 50% in winter.
S-60	4/17/17	1218	34.60831	73.39543	1530	Khaulian	Abdul Wahid	17	7.9	463	Yes	Yes	Yes	100	25	1000	1916	Pipe	Spring is more than 100 years old, water flow reduces 50% in winter. Khaulian Darweshabad residents installed a pipeline in April 2017.
S-61	4/17/17	1240	34.60906	73.39352	1349	Khaulian	Muhammad	16	7.9	314	Yes	No	No	–	15	50	1916	Manual	Spring water is used in Ramzan only by Khaulian residents. Flow reduce 50% in winter.

ID	Date	Time	Latitude	Longitude	Altitude (m)	Village	Owner	Temp (°C)	pH	Conductivity (µs/cm)	Human Drinking	Human Other Use	Livestock use	Livestock	Total Households	Water Use per HH (Liters)	Active From	Extraction Method	Comments
S-62	4/17/17	1250	34.60925	73.39417	1355	Khaulian Darwesh abad	Abdul Wahid	18	8.4	457	No	No	No	–	–	–	1916	Manual	No usage of water from this spring. Spring is more than 100 years old. Flow reduce 50% in winter.
S-63	4/17/17	1310	34.61112	73.39345	1272	Khaulian Darwesh abad	Mian Noorani	19	8.1	386	No	No	No	–	–	–	1986	Manual	The spring is more than 30 years old. No usage of water from this spring, spring dry in winter.
S-64	4/17/17	1322	34.6111	73.39313	1289	Khaulian Darwesh abad	Abdul Rasheed	19	8.5	316	No	No	No	–	–	–	1966	Manual	No usage of spring, spring dry in winter. Spring id more than 50 years old.
S-65	4/17/17	1328	34.61146	73.39353	1309	Khaulian Darwesh abad	Abdul Rasheed	18	7.5	387	Yes	No	No	–	5	50	1916	Manual	Flow reduce 50% in winter; 5 nearby houses use this water in Ramzan. Spring is more than 100 years old.
S-66	4/17/17	1420	34.6131	73.39517	1284	Khaulian Darwesh abad	Abdul Qadir	18	8.2	266	Yes	No	No	–	10	50	1916	Manual	Spring water is use for drinking only, flow reduce 50% in winter. Spring is more than 100 years old.
S-67	4/18/17	940	34.60814	73.38847	1357	Khaulian Darwesh abad	Wali Rehman	18	7.7	354	No	No	No	–	–	–	1986	Manual	Spring is more than 30 years old, no usage of spring water. Spring active from April to October
S-68	4/18/17	1000	34.60795	73.38812	1412	Khaulian Darwesh abad	Mir Wali	15	8.2	363	Yes	Yes	Yes	120	50	400	1816	Pipe	The spring is more than 200 years old, water flow reduces 50% in winter. Public health department installed a pipeline in 1980.
S-69	4/18/17	1020	34.60865	73.38755	1300	Khaulian Darwesh abad	Fazal e Haq	17	7.5	435	Yes	No	No	–	3	50	1916	Manual	Spring water is use for drinking only, flow reduces 50% in winter. Spring is more than 100 years old.
S-70	4/18/17	1030	34.60953	73.38777	1289	Khaulian Darwesh abad	Muhammad Ameen	18	8.1	319	Yes	No	No	–	3	50	1916	Manual	The spring in more than 100 years old. Spring water use for drinking. Flow reduce 50 % in winter.
S-71	4/18/17	1045	34.60989	73.38879	1271	Khaulian Darwesh abad	Muhammad Ameen	19	8.3	253	Yes	Yes	Yes	6	2	250	1916	Pipe	Spring is more than 100 years old, water flow reduces 50% in winter. Water is supplied through pipeline installed by residents in 2014 at their expense.
S-72	4/18/17	1100	34.61045	73.38819	1238	Khaulian Darwesh abad	Ghulam Nabi	19	7.7	260	No	No	No	–	–	–	N/A	Manual	No usage of spring water, water flow reduces 50% in winter. This spring is more than 50 years old.
S-73	4/18/17	1118	34.61119	73.38755	1200	Khaulian Darwesh abad	Aziz ur Rehman	21	8.3	315	Yes	Yes	Yes	120	40	400	1716	Pipe and Manual	This spring is more than 300 years old. Water flow remains the same through year. Public health department installed pipeline in 1986 for supply of water.
S-74	4/18/17	1130	34.61359	73.38978	1204	Nakka	Rehmat Ullah	17	8.0	360	Yes	Yes	Yes	60	20	300	1916	Pipe and Manual	The spring is more than 100 years old, water flow remains constant through year. NGO installed pipeline in 2007 for supplying of water.
S-75	4/18/17	1237	34.60495	73.39005	1577	Khaulian	M. Shafique / M. Latif	13	7.9	242	Yes	Yes	Yes	2	1	200	1916	Manual	Spring is more than 100 years old. Flow remains constant through year.
S-77	4/18/17	1306	34.60473	73.38991	1641	Khaulian	Qari Younas	19	8.5	250	Yes	Yes	Yes	6	1	200	1965	Pipe	Spring water flow reduce 50% in winter. The spring is more than 50 years old. This house has also a supply line coming from Baida Nakka.
S-78	4/18/17	1341	34.60168	73.38181	1369	Dabrian	Haroon	19	8.2	293	Yes	Yes	No	–	1	300	1966	Pipe	Spring water use in a hotel, flow reduce 50% in winter. Water is supplied through pipeline from 2015, installed by hotel owner on his expense.
S-80	4/18/17	1452	34.60261	73.37977	1284	Sandoori	Latif	17	8.0	285	No	No	Yes	60	17	100	1816	Manual	The spring water is used for animals only. Spring flow reduce 50% in winter.

ID	Date	Time	Latitude	Longitude	Altitude (m)	Village	Owner	Temp (°C)	pH	Conductivity (µs/cm)	Human Drinking	Human Other Use	Livestock use	Livestock	Total Households	Water Use per HH (Liters)	Active From	Extraction Method	Comments
S-81	4/18/17	1545	34.5994	73.38125	1560	Damrian	Anayat ur Rehman	13	8.0	278	Yes	Yes	Yes	150	50	600	1916	Pipe	Spring is more than 100 years old. Public health department installed water supply line in 1980 from Shamber 3 km away from Dabrian, which is damaged in 2005 earth quake. NGO installed water supply line in 2007. Flow reduce 50% in winter.
S-82	4/18/17	1610	34.59895	73.37673	1470	Dabrian	Abdul Rasheed	17	7.7	503	Yes	Yes	Yes	50	25	300	1916	Pipe and Manual	Public health department installed water supply line in 1985 which was damaged in 2005 earthquake. The residents installed water supply line in 2007 at their own expense. The spring water flow reduce 50% in winter. The spring is more than 100 years old.
S-83	4/18/17	1625	34.59762	73.3778	1506	Dabrian	Shabbir Mian	17	7.8	288	Yes	Yes	Yes	100	10	1000	1816	Pipe	The spring is more than 200 years old. Water flow reduce 50% in winter. Due to large quantity of animals more water is consumed.
S-84	4/18/17	1635	34.59746	73.37807	1523	Dabrian	Abdul Hameed	20	8.5	328	Yes	Yes	Yes	20	4	150	1916	Pipe	Spring is more than 100 years old, flow reduce 50% in winter.
S-85	4/18/17	1705	34.59442	73.37799	1548	Dabrian	Zahoor	18	7.9	330	Yes	Yes	Yes	20	50	200	1916	Pipe and Manual	Spring is more than 100 years old, spring water reduce 50% in winter. Four houses have a supply line installed by them with their own cost while 46 houses take water manually.
S-98	4/19/17	1650	34.58722	73.37037	1126	Kappi Gali	Haji Ghulam Mubarak	20	7.9	360	Yes	No	No	–	5	50	1966	Manual	The spring is more than 50 years old, flow reduce 50% in winter. The spring water is used for drinking only.
S-99	4/19/17	1716	34.58852	73.36779	1186	Kappi Gali	Aziz / Zia ul Haq	20	7.8	500	Yes	No	No	–	15	50	1916	Manual	The spring is more than 100 years old, water flow reduces 50% in winter. The spring water is used for drinking only.
S-101	4/20/2017	1315	34.59051	73.37214	1263	Kappi Gali	Bakhtiyar	NA	NA	NA	NA	NA	NA	NA	NA	NA	1990	Manual	The spring was active for fifteen years, spring was located in Nullah, land was backfilled with gravel and stone by land lord in 2006. Before 2006 Kappi Gali 10 houses uses this spring water.
S-104	6/20/2018	NA	34.65295	73.44764	NA	Hariwala Nabba (Machi Ban)	Shabbir Shah	22	7.8	358	Yes	Yes	No	30	140	230	1910	Pipe	Consistent water flow throughout the year. It is also used for car wash at roads.
S-105	6/20/2018	NA	34.64995	73.445092	NA	Hariwala Nabba (Jabba Paras)	Peer Zaman Shah	20	7.7	438	Yes	Yes	No	40	160	320	1910	Pipe	No comments.
S-106	6/21/2018	NA	34.65462	73.44590	NA	Harriwala Nabba	Gulam Ahmed Shah	22	7.9	401	Yes	Yes	No	10	70	300	1910	Pipe	Water utilized by two nearby villages. Seventy houses dependent upon water usage through this spring
S-107	6/21/2018	NA	34.65556	73.44588	NA	Harriwala Nabba	Gulam Ahmed Shah	21	7.3	498	Yes	Yes	No	10	70	300	1910	Pipe	No comments.
S-108	6/21/2018	NA	34.65322	73.44584	NA	Harriwala Nabba	Abdul Sttar Shah	23	7.7	405	Yes	Yes	No	15	20	180	1910	Pipe	No comments.

NA means data is not available

– means the value reported is zero

Appendix E: Water Analysis Results

E.1 Methodology for Water Quality Sampling

Water samples were collected with following steps.

- ▶ Water samples were collected directly from the river using stainless steel sampler.
- ▶ Powder-free disposable gloves be worn at all times when transferring water from the sampler to the sample bottles.
- ▶ Field physical parameters which include pH, DO, temperature, electrical conductivity were recorded during the sampling utilized calibrated meters.
- ▶ Bottles with required preservation were used to store samples. The bottles were opened for the minimum amount of time needed to rinse and fill them.
- ▶ Sample bottles were rinsed with water from the sampler except for those containers in which preservative is already in the bottle.
- ▶ Sample bottles were filled to the top to eliminate air space.
- ▶ Sample bottles were capped as soon as they were filled, placed in plastic bags, and placed into coolers with plenty of ice packs. Photographs of the sampling are shown in **Exhibit E.1**.

Quality Control Samples

One duplicate sample was collected as part of QC check. In addition as part of the lab analysis lab blanks and lab duplicates were also analyzed.

The identity of the field duplicate was not known to the testing laboratory. In addition, the lab blanks and duplicates were also utilized and the result discrepancy is within acceptable limits.

Sample Handling

- ▶ Each sample was given a proper and unique identification.
- ▶ Quality control sample was labeled similar to normal samples and identity was kept confidential from the testing laboratory.
- ▶ Sample labels included, sample identification, collection date and time, parameter group *e.g.* metals, nutrients, physical + major ions, etc; preservative if any was added
- ▶ In addition to the above information, the field notes were recorded, GPS coordinates were taken, well depth was measured, and the source was photographed.

Exhibit E.1: Photographs from the Water Sampling



Collection of Kunhar River Sample for analysis



Collection of sample and duplicate

E.2 Water Quality Lab Reports

See following pages.



No: 10405-ES-

Dated: 14th March, 2017

CERTIFICATE OF ANALYSIS

Ref: **F6064BKP**

Sample ID: As per client ID

Client: Hagler Bailly Pakistan (Pvt) Ltd
39, Street 3, E7,
Islamabad, 44000
Pakistan.
Tel: +92 (51)-261-2-0200-07
(Attn: Mr. Asif Mahmood)

Project:

Date/Time sample received at lab: 08-03-2017 / 10:00 AM

Sample Description: Four River water samples were received at lab with following details;

SAMPLE ID	NATURE OF SAMPLE	COLLECTION DATE	TIME	REMARKS
W-1	River Water	Feb 28, 2017	-	-
W-3	River Water	Feb 28, 2017	-	-
W-4	River Water	Feb 28, 2017	-	-

Dr. M. Mansha
General Manager
Environmental Monitoring &
Modeling Division



PAKISTAN SPACE & UPPER ATMOSPHERE RESEARCH COMMISSION

(SUPARCO ENVIRONMENTAL LABORATORY)



No: 10405-ES-

Dated: 14th March, 2017

		Lab ID		K110.6	K126	K139
		Sample ID		W-1	W-3	W-4
		Unit	*LOR	Result		
Method Reference	Analysis Description	Date of Analysis 19-23 Dec 2016				
US-EPA 200.8	Ag	mg/l	<0.001	0.007	0.009	0.010
US-EPA 200.8	Al	mg/l	<0.001	0.037	0.082	0.095
US-EPA 200.8	As	mg/l	<0.001	<0.001	0.006	0.005
US-EPA 200.8	B	mg/l	<0.001	0.011	0.019	0.016
US-EPA 200.8	Ba	mg/l	<0.001	0.007	0.015	0.018
US-EPA 200.8	Cd	mg/l	<0.001	<0.001	<0.001	<0.001
US-EPA 200.8	Cr	mg/l	<0.001	<0.001	0.005	0.008
US-EPA 200.8	Hg	mg/l	<0.001	<0.001	<0.001	<0.001
US-EPA 200.8	Mn	mg/l	<0.001	<0.001	0.021	0.024
US-EPA 200.8	Ni	mg/l	<0.001	<0.001	0.007	0.009
US-EPA 200.8	Pb	mg/l	<0.001	<0.001	<0.001	<0.001
US-EPA 200.8	Sb	mg/l	<0.001	<0.001	<0.001	<0.001
US-EPA 200.8	Se	mg/l	<0.001	<0.001	<0.001	<0.001
US-EPA 200.8	Zn	mg/l	<0.001	0.014	0.038	0.031
US-EPA 180.1	Turbidity	NTU	<0.01	1.66	4.83	4.72
US-EPA 300.1	Nitrate	mg/l	<0.01	0.025	0.047	0.053
US-EPA 365.3	Phosphate	mg/l	<0.020	<0.020	<0.020	<0.020

*LOR: Level of Reporting

CERTIFICATE OF ANALYSIS

Work Order : KL1704923 Amendment : 1 Client : HAGLER BAILLY PAKISTAN Contact : MR. Asif Mahmood Address : Block 1, Commercial Area, Street 21, F8/2 Islamabad Pakistan 44000 E-mail : AMahmood@haglerbailly.com.pk Telephone : ---- Facsimile : ---- Project : BPK Order number : ---- C-O-C number : 19494 Sampler : SAEED NAWAZ Site : ---- Quote number : QT35828 - BTEX / TPH / METALS	Page : 1 of 4 Laboratory : ALS Technichem (M) Sdn. Bhd. Contact : NURUL AINA Address : WISMA ALS, 21, Jalan Astaka U8/84, Bukit Jelutong Shah Alam Selangor Malaysia 40150 E-mail : Nurul.Aina@alsglobal.com Telephone : +603 7845 8257 Facsimile : +603 7845 8258 QC Level : ALS Malaysia Standard Quality Schedule Date Samples Received : 27-Apr-2017 16:30 Date Analysis Commenced : 02-May-2017 Issue Date : 16-Jun-2017 18:57 No. of samples received : 6 No. of samples analysed : 6
---	---

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



Signatories

This laboratory is accredited under STANDARDS MALAYSIA. The tests reported herein have been performed in accordance with laboratory's Terms of Accreditation. This document has been electronically signed by authorized signatories indicated below. Electronic signing has been carried out in compliance with procedure specified in 21 CFR Part 11.

Signatories

Position

Norain Yahya

Chemist (IKM No: M/4233/7042/15)



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, ASTM, NIOSH and BS EN. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

∅ = ALS is not accredited for these tests.

~ = Indicates an estimated value.

- ALS TECHNICHEM prepares this Test Report based on the tests requested and on the specific sample(s) submitted for analysis. The significance of this Report is subject to the adequacy and representative character of the sample(s) and to the comprehensiveness of the tests requested or made. ALS TECHNICHEM assumes no responsibility for variations in quality or other characteristic of the product produced or supplied under conditions over which ALS TECHNICHEM has no control.
ALS TECHNICHEM acts for the customer from whom the instructions to act have originated. No other party is entitled to give instructions, particularly on the scope of analysis or delivery of report or certificate, unless so authorized by the customer.
- ALS TECHNICHEM undertakes to exercise due care and skill in the performance of its analytical and consultancy services but no warranties are given and none may be implied directly or indirectly relating to ALS TECHNICHEM's test results, services or facilities. In no event shall ALS TECHNICHEM be liable to collateral, special or consequential damage.
- **ND : Recovery not determined, background level >= 4x spike level**



Analytical Results

Sub-Matrix: WATER

Compound	Method	LOR	Unit	Client sample ID	W-2	W-5	W-6	W-6(D)	W-7
				Sampling date/time	14-Apr-2017 09:55	14-Apr-2017 12:45	14-Apr-2017 10:20	14-Apr-2017 10:25	14-Apr-2017 11:15
				KL1704923-001	KL1704923-002	KL1704923-003	KL1704923-004	KL1704923-005	
Metals and Major Cations									
Aluminium	USEPA6020A	1	µg/L		74.2	220	18.1	18.1	3.6
Antimony	USEPA6020A	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	USEPA6020A	1	µg/L		3.0	1.2	<1.0	<1.0	7.9
Barium	USEPA6020A	1	µg/L		87.3	27.9	38.8	36.8	300
Boron	USEPA6020A	1	µg/L		4.7	<1.0	16.3	14.7	<1.0
Cadmium	USEPA6020A	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chromium	USEPA6020A	1	µg/L		<1.0	1.2	<1.0	<1.0	<1.0
Lead	USEPA6020A	1	µg/L		3.3	1.0	<1.0	<1.0	<1.0
Manganese	USEPA6020A	1	µg/L		10.2	79.3	<1.0	<1.0	<1.0
Mercury	USEPA6020A	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	USEPA6020A	1	µg/L		<1.0	3.5	<1.0	<1.0	<1.0
Selenium	USEPA6020A	10	µg/L		<10.0	<10.0	<10.0	<10.0	<10.0
Silver	USEPA6020A	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0



Analytical Results

Sub-Matrix: **WATER**

				Client sample ID	WFB	----	----	----	----
				Sampling date/time	14-Apr-2017 08:25	----	----	----	----
Compound	Method	LOR	Unit	KL1704923-006	-----	-----	-----	-----	-----
Metals and Major Cations									
Aluminium	USEPA6020A	1	µg/L	1.6	----	----	----	----	----
Antimony	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Arsenic	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Barium	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Boron	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Cadmium	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Chromium	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Lead	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Manganese	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Mercury	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Nickel	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----
Selenium	USEPA6020A	10	µg/L	<10.0	----	----	----	----	----
Silver	USEPA6020A	1	µg/L	<1.0	----	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: KL1704923	Page	: 1 of 5
Amendment	: 1		
Client	: HAGLER BAILLY PAKISTAN	Laboratory	: ALS Technichem (M) Sdn. Bhd.
Contact	: MR. Asif Mahmood	Contact	: NURUL AINA
Address	: Block 1, Commercial Area, Street 21, F8/2 Islamabad Pakistan 44000	Address	: WISMA ALS, 21, Jalan Astaka U8/84, Bukit Jelutong Shah Alam Selangor Malaysia 40150
E-mail	: AMahmood@haglerbailly.com.pk	E-mail	: Nurul.Aina@alsglobal.com
Telephone	: ----	Telephone	: +603 7845 8257
Facsimile	: ----	Facsimile	: +603 7845 8258
Project	: BPK	QC Level	: ALS Malaysia Standard Quality Schedule
Order number	: ----	Date Samples Received	: 27-Apr-2017
C-O-C number	: 19494	Date Analysis Commenced	: 02-May-2017
Sampler	: SAEED NAWAZ	Issue Date	: 16-Jun-2017
Site	: ----	No. of samples received	: 6
Quote number	: QT35828 - BTEX / TPH / METALS	No. of samples analysed	: 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits



Signatories

This laboratory is accredited under STANDARDS MALAYSIA. The tests reported herein have been performed in accordance with laboratory's Terms of Accreditation. This document has been electronically signed by authorized signatories indicated below. Electronic signing has been carried out in compliance with procedure specified in 21 CFR Part 11.

Signatories

Position

Norain Yahya

Chemist (IKM No: M/4233/7042/15)



General Comments

The analytical procedures used by ALS Malaysia have been developed from established internationally recognized procedures. In-house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :

- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC
- CFU = Colony Forming Unit
- MPN = Most Probable Number
- PN = Probable Number
- Result <LOR = Not Detected (ND)



Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method SOP-23 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
Metals and Major Cations : USEPA6020A / Determination of Metals by ICP-MS									
KL1704922-001	Anonymous	Antimony	7440-36-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		Arsenic	7440-38-2	1	µg/L	41.6	39.3	5.50	0% - 20%
		Barium	7440-39-3	1	µg/L	146	145	0.463	0% - 20%
		Cadmium	7440-43-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		Chromium	7440-47-3	1	µg/L	24.3	22.0	9.97	0% - 20%
		Lead	7439-92-1	1	µg/L	118	110	6.41	0% - 20%
		Manganese	7439-96-5	1	µg/L	1250	1180	5.39	0% - 20%
		Mercury	7439-97-6	1	µg/L	<1.0	<1.0	0.00	No Limit
		Nickel	7440-02-0	1	µg/L	40.0	37.2	7.08	0% - 20%
		Selenium	7782-49-2	10	µg/L	<10.0	<10.0	0.00	No Limit
		Silver	7440-22-4	1	µg/L	<1.0	<1.0	0.00	No Limit
		Boron	7440-42-8	1	µg/L	2090	1990	4.99	0% - 20%
		Aluminium	7429-90-5	1	µg/L	2500	2290	8.58	0% - 20%



Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike	Spike Recovery (%)	Recovery Limits (%)	
					Concentration	LCS	Low	High
Metals and Major Cations : USEPA6020A/Determination of Metals by ICP-MS								
Antimony	7440-36-0	1	µg/L	<1.0	5 µg/L	91.6	80	120
Arsenic	7440-38-2	1	µg/L	<1.0	5 µg/L	107	80	120
Barium	7440-39-3	1	µg/L	<1.0	5 µg/L	92.0	80	120
Cadmium	7440-43-9	1	µg/L	<1.0	5 µg/L	102	80	120
Chromium	7440-47-3	1	µg/L	<1.0	5 µg/L	107	80	120
Lead	7439-92-1	1	µg/L	<1.0	5 µg/L	102	80	120
Manganese	7439-96-5	1	µg/L	<1.0	5 µg/L	116	80	120
Mercury	7439-97-6	1	µg/L	<1.0	5 µg/L	106	80	120
Nickel	7440-02-0	1	µg/L	<1.0	5 µg/L	120	80	120
Selenium	7782-49-2	10	µg/L	<10.0	5 µg/L	94.3	80	120
Silver	7440-22-4	1	µg/L	<1.0	5 µg/L	107	80	120
Boron	7440-42-8	1	µg/L	<1.0	5 µg/L	118	80	120
Aluminium	7429-90-5	1	µg/L	<1.0	5 µg/L	107	80	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
Metals and Major Cations : USEPA6020A/Determination of Metals by ICP-MS							
KL1704922-002	Anonymous	Aluminium	7429-90-5	10 µg/L	99.2	80	120
		Antimony	7440-36-0	10 µg/L	97.1	80	120
		Arsenic	7440-38-2	10 µg/L	98.8	80	120
		Barium	7440-39-3	10 µg/L	# Not Determined	80	120
		Boron	7440-42-8	10 µg/L	87.4	80	120
		Cadmium	7440-43-9	10 µg/L	80.7	80	120
		Chromium	7440-47-3	10 µg/L	91.6	80	120
		Lead	7439-92-1	10 µg/L	80.9	80	120
		Manganese	7439-96-5	10 µg/L	80.7	80	120
		Mercury	7439-97-6	10 µg/L	86.7	80	120
		Nickel	7440-02-0	10 µg/L	83.0	80	120
		Selenium	7782-49-2	10 µg/L	117	80	120

Page : 5 of 5
 Work Order : KL1704923 Amendment 1
 Client : HAGLER BAILLY PAKISTAN
 Project : BPK



Sub-Matrix: **WATER**

				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Recovery Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
Metals and Major Cations : USEPA6020A/Determination of Metals by ICP-MS - continued							
KL1704922-002	Anonymous	Silver	7440-22-4	10 µg/L	87.8	80	120

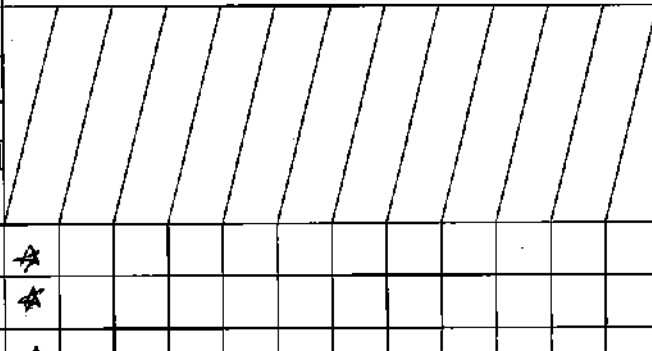



ALS TECHNICHEM (M) SDN BHD (117964-P)


No. 9, Jalan Astaka U8/84,
Seksyen U8, Bukit Jelutong,
40150 Shah Alam, Selangor Darul Ehsan.
Tel: (603) 7845 8257 Fax: (603) 7845 8258


CHAIN OF CUSTODY RECORD

No. 19494

COMPANY: <i>Hagler Bailly Pakistan</i>		PROJECT: <i>BPK</i>		PURCHASE ORDER NO.:			
POSTAL ADDRESS:				FOR LAB USE ONLY			
<i>Block 1, Commercial Area, Street 21</i>				LAB BATCH NO.:			
<i>F 872, Islamabad</i>				NO OF SAMPLES:			
PHONE: <i>92 51 2857 200-7</i>		FAX: <i>92 51 2857 208-9</i>		ANALYSIS REQUIRED 			
SEND REPORT TO: <i>Asif Mahmood / Aziz Karim / Hidayat Hasan</i>							
SEND INVOICE TO: <i>Hanuman Mansoor</i>							
SAMPLE ID	MATRIX	DATE	TIME	TYPE & PRESERVATIVE	NO.	REMARKS	
<i>W-2</i>	<i>water</i>	<i>14/4/17</i>	<i>09:55</i>	<i>(2x120ml Plastic)</i>	<i>01</i>	<i>*</i>	Environmental Division Kuala Lumpur Work Order Reference KL1704923  Telephone: + 603 7845 8257
<i>W-5</i>	<i>"</i>	<i>"</i>	<i>12:45</i>	<i>"</i>	<i>01</i>	<i>*</i>	
<i>W-6</i>	<i>"</i>	<i>"</i>	<i>10:20</i>	<i>"</i>	<i>01</i>	<i>*</i>	
<i>W-6(D)</i>	<i>"</i>	<i>"</i>	<i>10:25</i>	<i>"</i>	<i>01</i>	<i>*</i>	
<i>W-7</i>	<i>"</i>	<i>"</i>	<i>11:15</i>	<i>"</i>	<i>01</i>	<i>*</i>	
<i>WFB</i>	<i>"</i>	<i>"</i>	<i>08:25</i>	<i>"</i>	<i>01</i>	<i>*</i>	

Sampled by: *Saeed Nawaz* Shipped Via: *Fed Ex* Consignment No.:

Relinquished by:	Date: <i>24/4/17</i>	Received by:	Date:	COMMENTS / SPECIAL HANDLING <i>* Analyze as per attached List</i>
Print Name: 	Time:	Print Name:	Time:	
Relinquished by:	Date:	Received by:	Date:	
Print Name:	Time:	Print Name:	Time:	

Received by Lab:  Date: *24/4/17*

Container Type & Preservatives Codes: P=Plastic; G=Glass; V=Vial; J=Jar; HN=Nitric acid preserved; HC=Hydrochloric acid preserved; HS=Sulfuric acid preserved; ST=Sterile bottle; B=Sodium hydroxide preserved; Z=Zinc acetate preserved; E=EDTA preserved.

Parameters List

Ag

Al

As

B

Ba

Cd

Cr

Hg

Mn

Ni

Pb

Sb

Se

FINAL REPORT

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Acc. No: XLF-12964 **Ref #:** W-1 **Patient ID:** BR-C-68490
Patient Name: C/O Hagler Bailly Pakistan **Sex:** Unknown **Age:** 1M
Specimen Received @: Main Lab 14/04/2017 10:18 PM

MICROBIOLOGY REPORT

WATER FOR CULTURE

Source : N/A

COMMENTS: 1 : MPN (Most Probable Number)of COLIFORMS: 18+/100 ml

2 : MPN (Most Probable Number)of E.COLI: 18+/100 ml

WATER IS BACTERIOLOGICALLY UNSATISFACTORY FOR HUMAN CONSUMPTION.

SUGGESTED CRITERIA OF W.H.O.

<u>WATER QUALITY</u>	<u>MPN. OF COLIFORM</u>	<u>MPN. OF E. COLI.</u>
EXCELLENT	0	0
SATISFACTORY	1 - 3	0
SUSPICIOUS	4 - 10	0
UNSATISFACTORY	> 10	0, 1 or more

NOTE: MINERAL WATER OR TREATED WATER SHOULD BE FREE OF COLIFORMS AND E.COLI.

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CSR: 051-831 1006

LAHORE LAB
Tel: 042-3521 9184

Electronically signed & verified by Dr. Asim Saeed (PMDC#50537-P)

Report Date: April 19, 2017 5:01 pm **Init:** Humaira Sabir 1665
Specimen Received @Lab: 14/04/2017 10:18PM
Tests Performed @Lab : 14/04/2017 10:33PM



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Dr. Hina Bilal
MBBS, M.Phil (Hema)

Acc. No: XLF-12960 **Ref #:** W-2 **Patient ID:** BR-C-68490
Patient Name: C/O Hagler Bailly Pakistan **Sex:** Unknown **Age:** 2M
Specimen Received @: Main Lab 14/04/2017 10:18 PM

MICROBIOLOGY REPORT

WATER FOR CULTURE

Source : N/A

COMMENTS: 1 : MPN (Most Probable Number)of COLIFORMS: 18+/100 ml

2 : MPN (Most Probable Number)of E.COLI: 18+/100 ml

WATER IS BACTERIOLOGICALLY UNSATISFACTORY FOR HUMAN CONSUMPTION.

SUGGESTED CRITERIA OF W.H.O.

<u>WATER QUALITY</u>	<u>MPN. OF COLIFORM</u>	<u>MPN. OF E. COLI.</u>
EXCELLENT	0	0
SATISFACTORY	1 - 3	0
SUSPICIOUS	4 - 10	0
UNSATISFACTORY	> 10	0, 1 or more

NOTE: MINERAL WATER OR TREATED WATER SHOULD BE FREE OF COLIFORMS AND E.COLI.

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LAHORE LAB

Tel: 042-3521 9184

Electronically signed & verified by Dr. Asim Saeed (PMDC#50537-P)

Report Date: April 19, 2017 5:00 pm **Init:** Humaira Sabir 1665
Specimen Received @Lab: 14/04/2017 10:18PM
Tests Performed @Lab : 14/04/2017 10:33PM



FINAL REPORT

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Dr. Moniba Zafar
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Dr. Hina Bilal
MBBS, M.Phil (Hema)

Acc. No: XLF-12959 **Ref #:** W-5 **Patient ID:** BR-C-68490
Patient Name: C/O Hagler Bailly Pakistan **Sex:** Unknown **Age:** 1M
Specimen Received @: Main Lab 14/04/2017 10:18 PM

MICROBIOLOGY REPORT

WATER FOR CULTURE

Source : N/A

COMMENTS: 1 : MPN (Most Probable Number)of COLIFORMS: 18+/100 ml

2 : MPN (Most Probable Number)of E.COLI: 18+/100 ml

WATER IS BACTERIOLOGICALLY UNSATISFACTORY FOR HUMAN CONSUMPTION.

SUGGESTED CRITERIA OF W.H.O.

<u>WATER QUALITY</u>	<u>MPN. OF COLIFORM</u>	<u>MPN. OF E. COLI.</u>
EXCELLENT	0	0
SATISFACTORY	1 - 3	0
SUSPICIOUS	4 - 10	0
UNSATISFACTORY	> 10	0, 1 or more

NOTE: MINERAL WATER OR TREATED WATER SHOULD BE FREE OF COLIFORMS AND E.COLI.

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Electronically signed & verified by Dr. Asim Saeed (PMDC#50537-P)

Report Date: April 19, 2017 4:58 pm **Init:** Humaira Sabir 1665
Specimen Received @Lab: 14/04/2017 10:18PM
Tests Performed @Lab : 14/04/2017 10:37PM



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Dr. Moniba Zafar
MBBS, FCPS (Histo)

Dr. Hina Bilal
MBBS, M.Phil (Hema)

Acc. No: XLF-12961 **Ref #:** W-6 **Patient ID:** BR-C-68490
Patient Name: C/O Hagler Bailly Pakistan **Sex:** Unknown **Age:** 1M
Specimen Received @: Main Lab 14/04/2017 10:18 PM

MICROBIOLOGY REPORT

WATER FOR CULTURE

Source : N/A

COMMENTS: 1 : MPN (Most Probable Number)of COLIFORMS: 1+/100 ml

2 : MPN (Most Probable Number)of E.COLI: 0+/100 ml

WATER IS BACTERIOLOGICALLY SATISFACTORY FOR HUMAN CONSUMPTION.

SUGGESTED CRITERIA OF W.H.O.

<u>WATER QUALITY</u>	<u>MPN. OF COLIFORM</u>	<u>MPN. OF E. COLI.</u>
EXCELLENT	0	0
SATISFACTORY	1 - 3	0
SUSPICIOUS	4 - 10	0
UNSATISFACTORY	> 10	0, 1 or more

NOTE: MINERAL WATER OR TREATED WATER SHOULD BE FREE OF COLIFORMS AND E.COLI.

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Report Date: April 20, 2017 4:23 pm **Init:** Humaira Sabir 1665
Specimen Received @Lab: 14/04/2017 10:18PM
Tests Performed @Lab : 14/04/2017 10:33PM



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Dr. Moniba Zafar
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Dr. Hina Bilal
MBBS, M.Phil (Hema)

Acc. No: XLF-12962 **Ref #:** W-6 (D) **Patient ID:** BR-C-68490
Patient Name: C/O Hagler Bailly Pakistan **Sex:** Unknown **Age:** 1M
Specimen Received @: Main Lab 14/04/2017 10:18 PM

MICROBIOLOGY REPORT

WATER FOR CULTURE

Source : N/A

COMMENTS: 1 : MPN (Most Probable Number)of COLIFORMS: 1+/100 ml

2 : MPN (Most Probable Number)of E.COLI: 0/100 ml

WATER IS BACTERIOLOGICALLY SATISFACTORY FOR HUMAN CONSUMPTION.

SUGGESTED CRITERIA OF W.H.O.

<u>WATER QUALITY</u>	<u>MPN. OF COLIFORM</u>	<u>MPN. OF E. COLI.</u>
EXCELLENT	0	0
SATISFACTORY	1 - 3	0
SUSPICIOUS	4 - 10	0
UNSATISFACTORY	> 10	0, 1 or more

NOTE: MINERAL WATER OR TREATED WATER SHOULD BE FREE OF COLIFORMS AND E.COLI.

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Report Date: April 20, 2017 4:24 pm **Init:** Humaira Sabir 1665
Specimen Received @Lab: 14/04/2017 10:18PM
Tests Performed @Lab : 14/04/2017 10:33PM



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Dr. Moniba Zafar
MBBS, FCPS (Histo)

Dr. Hina Bilal
MBBS, M.Phil (Hema)

Acc. No: XLF-12963 **Ref #:** W-7 **Patient ID:** BR-C-68490
Patient Name: C/O Hagler Bailly Pakistan **Sex:** Unknown **Age:** 1M
Specimen Received @: Main Lab 14/04/2017 10:19 PM

MICROBIOLOGY REPORT

WATER FOR CULTURE

Source : N/A

COMMENTS: 1 : MPN (Most Probable Number)of COLIFORMS: 18+/100 ml

2 : MPN (Most Probable Number)of E.COLI: 18+/100 ml

WATER IS BACTERIOLOGICALLY UNSATISFACTORY FOR HUMAN CONSUMPTION.

SUGGESTED CRITERIA OF W.H.O.

<u>WATER QUALITY</u>	<u>MPN. OF COLIFORM</u>	<u>MPN. OF E. COLI.</u>
EXCELLENT	0	0
SATISFACTORY	1 - 3	0
SUSPICIOUS	4 - 10	0
UNSATISFACTORY	> 10	0, 1 or more

NOTE: MINERAL WATER OR TREATED WATER SHOULD BE FREE OF COLIFORMS AND E.COLI.

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Tel: 042-3521 9184

Electronically signed & verified by Dr. Asim Saeed (PMDC#50537-P)

Report Date: April 19, 2017 4:59 pm **Init:** Humaira Sabir 1665
Specimen Received @Lab: 14/04/2017 10:19PM
Tests Performed @Lab : 14/04/2017 10:31PM





Hagler Bailly Pakistan

Environmental Monitoring & Analysis

Sample: River Water
Depth of Water Sample: 0.45 meter below water level
Sampling Coordinates: 33 39 38.10, 73 28 18.13
Project: BPK
Sample ID: K110.6
Sample Collected From: Corner
Sampling Date: February 28, 2017
Sampling Time: 09:20
Sampling Method: Grab

Parameter	Analytical Method	Unit	LOR	NSDW	WHO Guideline	NEQS	Analysis Results
Temperature	US EPA 170.1	°C	1.0	-	-	-	7.50
DO	US EPA 360.1	mg/l	0.1	-	-	-	11.24
EC	US EPA 120.1	µS/cm	1.0	-	-	-	260.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	194.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	8.22
TSS	US EPA 160.2	mg/l	4.0	-	-	200	29.00
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

Sample: River Water
Depth of Water Sample: 0.36 meter below water level
Sampling Coordinates: 34 35 02.29, 73 21 44.00
Project: BPK
Sample ID: K126
Sample Collected From: Centre
Sampling Date: February 28, 2017
Sampling Time: 10:30
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
Temperature	US EPA 170.1	°C	1.0	-	-	-	8.20
DO	US EPA 360.1	mg/l	0.1	-	-	-	11.45
EC	US EPA 120.1	µS/cm	1.0	-	-	-	312.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	218.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	8.44
TSS	US EPA 160.2	mg/l	4.0	-	-	200	43.50
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: River Water
Depth of Water Sample: 0.3 meter below water level
Sampling Coordinates: 34 29 12.85, 73 21 20.86
Project: BPK
Sample ID: K139
Sample Collected From: Corner
Sampling Date: February 28, 2017
Sampling Time: 12:20
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
Temperature	US EPA 170.1	°C	1.0	-	-	-	9.20
DO	US EPA 360.1	mg/l	0.1	-	-	-	11.52
EC	US EPA 120.1	µS/cm	1.0	-	-	-	285.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	208.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	8.50
TSS	US EPA 160.2	mg/l	4.0	-	-	200	40.50
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	5.26

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

Sample: River Water
Depth of Water Sample: 0.3 meter below water level
Sampling Coordinates: 34 29 12.85, 73 21 20.86
Project: BPK
Sample ID: K139 (D) Duplicate of K139
Sample Collected From: Corner
Sampling Date: February 28, 2017
Sampling Time: 12:30
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	206.00
TSS	US EPA 160.2	mg/l	4.0	-	-	200	39.50
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	5.54

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

mg/l: Milligram Per Liter

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

Sample: Water
Depth of Water Sample: 0.2 meter below water level
Sampling Coordinates: 34 37 54.0, 73 26 34.1
Project: BPK
Sample ID: W-2
Sample Collected From: Kawai Nullah
Sampling Date: April 14, 2017
Sampling Time: 09:55
Sampling Method: Grab

Parameter	Analytical Method	Unit	LOR	NSDW	WHO Guideline	NEQS	Analysis Results
Temperature	US EPA 170.1	°C	1.0	-	-	-	14.80
DO	US EPA 360.1	mg/l	0.1	-	-	-	9.64
EC	US EPA 120.1	µS/cm	1.0	-	-	-	348.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	178.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	8.46
TSS	US EPA 160.2	mg/l	4.0	-	-	200	15.00
BOD	US EPA 405.1	mg/l	5.0	-	-	80	5.59
COD	US EPA 410.2	mg/l	5.0	-	-	150	11.76
Turbidity	US EPA 180.1	NTU	0	<5	<5	-	6.00
Nitrate	US EPA 352.1	mg/l	0.1	<50	50	-	0.23
Phosphate	SMEW	mg/l	0.1	-	-	-	ND
Zinc	SMEW	mg/l	0.1	5	3	5	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

NTU: Nephelometric Turbidity Units

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: River Water
Depth of Water Sample: 0.2 meter below water level
Sampling Coordinates: 34 26 38.6, 73 21 32.0
Project: BPK
Sample ID: W-5
Sample Collected From: Talhatta near water pump
Sampling Date: April 14, 2017
Sampling Time: 12:45
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
Temperature	US EPA 170.1	°C	1.0	-	-	-	14.80
DO	US EPA 360.1	mg/l	0.1	-	-	-	10.65
EC	US EPA 120.1	µS/cm	1.0	-	-	-	218.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	130.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	8.20
TSS	US EPA 160.2	mg/l	4.0	-	-	200	107.00
BOD	US EPA 405.1	mg/l	5.0	-	-	80	5.28
COD	US EPA 410.2	mg/l	5.0	-	-	150	10.42
Turbidity	US EPA 180.1	NTU	0	<5	<5	-	15.00
Nitrate	US EPA 352.1	mg/l	0.1	<50	50	-	0.28
Phosphate	SMEW	mg/l	0.1	-	-	-	ND
Zinc	SMEW	mg/l	0.1	5	3	5	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

NTU: Nephelometric Turbidity Units

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: Spring Water
Depth of Water Sample: Surface/Sub Surface
Sampling Coordinates: 33 37 47.6, 73 25 45.8
Project: BPK
Sample ID: W-6
Sample Collected From: Community Spring near Kawai
Sampling Date: April 14, 2017
Sampling Time: 10:30
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
Temperature	US EPA 170.1	°C	1.0	-	-	-	14.50
DO	US EPA 360.1	mg/l	0.1	-	-	-	7.56
EC	US EPA 120.1	µS/cm	1.0	-	-	-	472.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	322.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	7.53
TSS	US EPA 160.2	mg/l	4.0	-	-	200	ND
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	ND
Turbidity	US EPA 180.1	NTU	0	<5	<5	-	4.00
Nitrate	US EPA 352.1	mg/l	0.1	<50	50	-	ND
Phosphate	SMEW	mg/l	0.1	-	-	-	ND
Zinc	SMEW	mg/l	0.1	5	3	5	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

NTU: Nephelometric Turbidity Units

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Environmental Monitoring & Analysis

Hagler Bailly Pakistan

Sample: Spring Water
Depth of Water Sample: Surface/Sub Surface
Sampling Coordinates: 33 37 47.6, 73 25 45.8
Project: BPK
Sample ID: W-6 (D) Duplicate of W-6
Sample Collected From: Community Spring near Kawai
Sampling Date: April 14, 2017
Sampling Time: 10:35
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
Temperature	US EPA 170.1	°C	1.0	-	-	-	14.50
DO	US EPA 360.1	mg/l	0.1	-	-	-	7.56
EC	US EPA 120.1	µS/cm	1.0	-	-	-	473.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	323.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	7.53
TSS	US EPA 160.2	mg/l	4.0	-	-	200	ND
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	ND
Turbidity	US EPA 180.1	NTU	0	<5	<5	-	4.00
Nitrate	US EPA 352.1	mg/l	0.1	<50	50	-	ND
Phosphate	SMEW	mg/l	0.1	-	-	-	ND
Zinc	SMEW	mg/l	0.1	5	3	5	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

NTU: Nephelometric Turbidity Units

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

Sample: Spring Water
Depth of Water Sample: Surface/Sub Surface
Sampling Coordinates: 33 35 36.6, 73 22 22.4
Project: BPK
Sample ID: W-7
Sample Collected From: Community Spring near Kappi Gali
Sampling Date: April 14, 2017
Sampling Time: 11:15
Sampling Method: Grab

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
Temperature	US EPA 170.1	°C	1.0	-	-	-	18.50
DO	US EPA 360.1	mg/l	0.1	-	-	-	7.80
EC	US EPA 120.1	µS/cm	1.0	-	-	-	363.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	206.00
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	8.20
TSS	US EPA 160.2	mg/l	4.0	-	-	200	ND
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	ND
Turbidity	US EPA 180.1	NTU	0	<5	<5	-	6.00
Nitrate	US EPA 352.1	mg/l	0.1	<50	50	-	ND
Phosphate	SMEW	mg/l	0.1	-	-	-	ND
Zinc	SMEW	mg/l	0.1	5	3	5	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

NTU: Nephelometric Turbidity Units

EC: Electrical conductivity

mg/l: Milligram Per Liter

DO: Dissolved Oxygen

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services



Hagler Bailly Pakistan

Environmental Monitoring & Analysis

Sample: Water
Project: BPK
Sample ID: W-FB (Field Blank)
Sampling Date: April 14, 2017

<i>Parameter</i>	<i>Analytical Method</i>	<i>Unit</i>	<i>LOR</i>	<i>NSDW</i>	<i>WHO Guideline</i>	<i>NEQS</i>	<i>Analysis Results</i>
EC	US EPA 120.1	µS/cm	1.0	-	-	-	3.00
TDS	US EPA 160.1	mg/l	10.0	<1,000	<1,000	3,500	ND
pH	US EPA 150.1		0.1	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0	7.50
TSS	US EPA 160.2	mg/l	4.0	-	-	200	ND
BOD	US EPA 405.1	mg/l	5.0	-	-	80	ND
COD	US EPA 410.2	mg/l	5.0	-	-	150	ND
Turbidity	US EPA 180.1	NTU	0	<5	<5	-	ND
Nitrate	US EPA 352.1	mg/l	0.1	<50	50	-	ND
Phosphate	SMEW	mg/l	0.1	-	-	-	ND
Zinc	SMEW	mg/l	0.1	5	3	5	ND

NEQS: National Environmental Quality Standards 2000 for discharge of effluent inland water

NSDW: National Environmental Quality Standards for Drinking Water (S.R.O 1062 (1) 2010)

WHO: World Health Organization (WHO Drinking Water Standards 2011, 4th Edition)

USEPA: United States Environmental Protection Agency

µS/cm: Micro Siemens per Centimeter

BOD: Biochemical Oxygen Demand

NTU: Nephelometric Turbidity Units

COD: Chemical Oxygen Demand

TSS: Total Suspended Solids

TDS: Total Dissolved Solids

EC: Electrical conductivity

mg/l: Milligram Per Liter

ND: Not Detected

Analyst

Saeed Nawaz

Checked By

Asif Mahmood
Manager, EMA Services

Appendix F: Air Quality

F.1 Sampling Methodology for Air Quality

Particulate matter was sampled using Airmetrics MiniVol Portable Air Samplers. This equipment draws an air sample through an inlet by a vacuum pump at a fixed flow rate. The particulates are filtered using an impactor and collected on a filter paper which is dried and weighed after the sampling to obtain the weight of particulates in the sampled Volume of air.

NO, NO₂ and SO₂ were measured using Gradko diffusion tubes. These tubes passively uptake pollutants via diffusion and hence require longer sampling of durations of between 2-4 weeks. The collected pollutants are quantified using ion chromatography.

The method, duration of sampling and laboratory for analysis is summarized in **Exhibit F.1**. Photographs of the particulate matter and diffusion tube sampling sites are shown in **Exhibit F.2**.

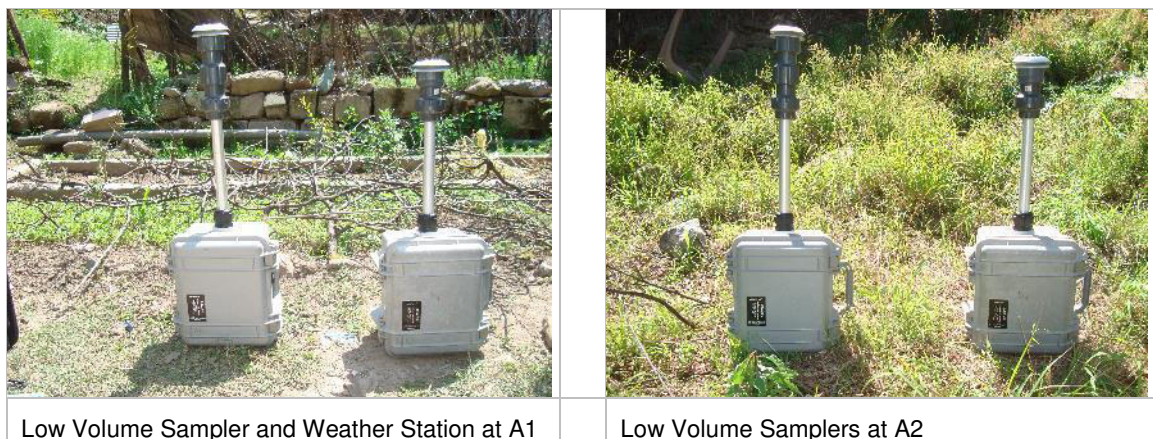
Exhibit F.1: Methodology and Duration of Sampling

<i>Parameter</i>	<i>Equipment</i>	<i>Date and Duration of Sampling</i>	<i>Lab for Analysis</i>
NO, NO ₂ and SO ₂	Passive diffusion tubes	March 19 to April 13, 2017 3 weeks	Gradko Lab, UK
PM ₁₀ and PM _{2.5}	Low Volume sampler	April 23 to 30, 2017 24 Hours at each location	HBP Lab, Islamabad
Weather data	Kestrel 5500 weather meter	During PM sampling 24 Hours at each location	Field data

Note:

1. Recommended sampling duration is between 2-4 weeks.
2. Weather data includes wind speed and direction, temperature, humidity and barometric pressure.

Exhibit F.2: Particulate Matter Sampling Site Photographs



Low Volume Sampler and Weather Station at A1

Low Volume Samplers at A2



Low Volume Samplers at A3



Low Volume Sampler and Weather Station at A4

F.2 Air Quality Lab Reports

See following pages.

LABORATORY ANALYSIS REPORT

DETERMINATION OF SULPHUR DIOXIDE IN DIFFUSION TUBES BY ION CHROMATOGRAPHY

REPORT NUMBER L02894R

BOOKING IN REFERENCE No L02894

DESPATCH NOTE No 35430

CUSTOMER Hagler Bailly Pakistan Ltd Attn: Aziz Karim
39, Street 3, E7
Islamabad 44000
Pakistan

DATE SAMPLES RECEIVED 19/04/2017

Location	Sample Number	Date Exposed	Date Finished	Exposure Hours	µg S Total	µg S - Blank	SO ₂ µg/m ³ *	SO ₂ ppb*
Paras	878593	19/03/2017	13/04/2017	594.93	<0.03	<0.02	<1.23	<0.46
Dam site	878594	20/03/2017	13/04/2017	573.17	<0.03	<0.02	<1.27	<0.48
Kiwai (Balakot)	878595	20/03/2017	13/04/2017	585.67	0.33	0.32	20.11	7.54
Barkot (PH)	878596	19/03/2017	13/04/2017	598.50	0.03	0.02	1.39	0.52
Balakot	878597	19/03/2017	13/04/2017	600.00	<0.03	<0.02	<1.22	<0.46
Kunhard	878598	19/03/2017	13/04/2017	594.93	0.04	0.03	1.82	0.68

Laboratory Blank

0.01

Comment: Results are blank subtracted

Exposure times were calculated from start and finish times given on the exposure sheet.

Results reported as <0.03µg S are below the reporting limit.

Overall M.U. ±6.0%

Reporting Limit

0.03µg S

Analysed on Dionex ICS3000 ICU5

Analyst Name Blazej Fiser

Report Checked By

K. Paldamova

Date of Analysis 02/05/2017

Date of Report

03/05/2017

Analysis has been carried out in accordance with in-house method GLM1

The Diffusion Tubes have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures calculations and assessments involving the exposure procedures and periods provided by the client are not within the scope of our UKAS accreditation. Those results obtained using exposure data shall be indicated by an asterisk (*). Any queries concerning the data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.
Form LQF32b Issue 7 – Oct 2016

Report Number L02894R

Page 1 of 1

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

LABORATORY ANALYSIS REPORT

NITROGEN DIOXIDE IN DIFFUSION TUBES BY U.V.SPECTROPHOTOMETRY

REPORT NUMBER L02895R

BOOKING REFERENCE No L02895

DESPATCH NOTE No 35430

CUSTOMER Hagler Bailly Ltd Attn.: Azis Karim
39, Street 3, E7
Islamabad 44000
Pakistan

DATE SAMPLES RECEIVED 19-Apr

Tube Numbers & Location			Exposure Data			NO ₂	NO _x	NO	NO ₂	NO _x	NO	TOTAL	TOTAL
NO ₂	NO _x		Date On	Date Off	Time (hr.)	ppb *	ppb *	ppb * +	µg/m ³ *	µg/m ³ *	µg/m ³ **	µG NO ₂	µG NO _x
878561	Paras	878582	19/03/2017	13/04/2017	594.93	2.90	3.71	0.81	5.55	7.10	1.55	0.24	0.31
878562	Dam site	878581	20/03/2017	13/04/2017	573.17	1.06	1.05		2.04	2.02		0.09	0.08
878563	Kiwai (Balakot)	878580	20/03/2017	13/04/2017	585.67	7.20	8.77	1.57	13.79	16.80	3.01	0.59	0.72
878564	Barakot (PH)	878579	19/03/2017	13/04/2017	598.50	1.58	2.71	1.13	3.03	5.20	2.16	0.13	0.23
878565	Balakot	878578	19/03/2017	13/04/2017	600.00	0.19	0.78	0.59	0.37	1.49	1.12	0.02	0.07
878566	Kunhard	878577	19/03/2017	13/04/2017	594.93	3.20	3.62	0.42	6.13	6.94	0.81	0.27	0.30

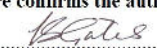
The Diffusion Tubes have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures calculations and assessments involving the exposure procedures and periods provided by the client are not within the scope of our UKAS accreditation. Those results obtained using exposure data shall be indicated by an asterisk. Any queries concerning the data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

Form LQF32c Issue 6 – February 2015

Report number L02895R

Page 1 of 2

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

LABORATORY ANALYSIS REPORT

Lab Blanks 600.00 0.07 0.28 0.21 0.14 0.54 0.40 0.006 0.024

Comment: Results are not blank subtracted

Where nitric oxide (NO) results have not been calculated result for NOX was lower than result for NO2.

The exposure times were calculated from start and finish times given on the exposure sheet.

***NO results are derived by subtracting NO2 from NOx.**

Results have been corrected to a temperature of 293K (20C)

Overall M.U. ±7.8%

Limit of Detection 0.033ug NOx, 0.010ug NO₂ on tube

Tube Preparation: 20%TEA/Water

Analysed on UVS08 Camspec M550

Analyst Name J. Kowalewska

Report Checked by Duncan Wilson

Date of Analysis 27/04/2017

Date of Report 27/04/2017

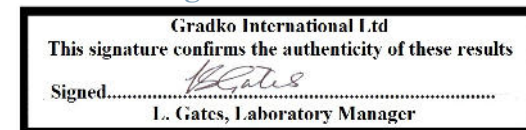
Analysis carried out in accordance with documented in-house Laboratory Method GLM7

The Diffusion Tubes have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures calculations and assessments involving the exposure procedures and periods provided by the client are not within the scope of our UKAS accreditation. Those results obtained using exposure data shall be indicated by an asterisk. Any queries concerning the data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

Form LQF32c Issue 6 – February 2015

Report number L02895R

Page 2 of 2



Appendix G: Traffic Survey

See following pages.

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Paras to Kaghan																
Weekday	5/4/2017	T1	Paras to Kaghan	07:00 to 08:00	5	16	16	1	7							45
Weekday	5/4/2017	T1	Paras to Kaghan	08:00 to 09:00	3	26	22		13		1					65
Weekday	5/4/2017	T1	Paras to Kaghan	09:00 to 10:00	7	42	18	1	8							76
Weekday	5/4/2017	T1	Paras to Kaghan	10:00 to 11:00	8	36	23	5	10				1			83
Weekday	5/4/2017	T1	Paras to Kaghan	11:00 to 12:00	7	42	27	1	6							83
Weekday	5/4/2017	T1	Paras to Kaghan	12:00 to 13:00	5	59	35	3	7							109
Weekday	5/4/2017	T1	Paras to Kaghan	13:00 to 14:00	9	35	26	1	8							79
Weekday	5/4/2017	T1	Paras to Kaghan	14:00 to 15:00	5	36	23	1	5							70
Weekday	5/4/2017	T1	Paras to Kaghan	15:00 to 16:00	13	38	34		7				1			93
Weekday	5/4/2017	T1	Paras to Kaghan	16:00 to 17:00	8	43	40		7							98
Weekday	5/4/2017	T1	Paras to Kaghan	17:00 to 18:00	4	41	33		9							87
Weekday	5/4/2017	T1	Paras to Kaghan	18:00 to 19:00	6	40	24		3	1	1					75
Weekday	5/4/2017	T1	Paras to Kaghan	19:00 to 20:00	6	34	17	2	4							63
Weekday	5/4/2017	T1	Paras to Kaghan	20:00 to 21:00	5	26	8	3	4							46
Weekday	5/4/2017	T1	Paras to Kaghan	21:00 to 22:00	2	29	21		7							59
Weekday	5/4/2017	T1	Paras to Kaghan	22:00 to 23:00	1	12	6		1							20
Weekday	5/4/2017	T1	Paras to Kaghan	23:00 to 00:00	2	12	3		3							20
Weekday	5/5/2017	T1	Paras to Kaghan	00:00 to 01:00		14	11		4							29
Weekday	5/5/2017	T1	Paras to Kaghan	01:00 to 02:00	1	13	11		6							31
Weekday	5/5/2017	T1	Paras to Kaghan	02:00 to 03:00	1	14	8		3							26

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	5/5/2017	T1	Paras to Kaghan	03:00 to 04:00		10	9		6							25
Weekday	5/5/2017	T1	Paras to Kaghan	04:00 to 05:00		9	4		3							16
Weekday	5/5/2017	T1	Paras to Kaghan	05:00 to 06:00		8	5		3							16
Weekday	5/5/2017	T1	Paras to Kaghan	06:00 to 07:00	2	12	3		7							24
					100	647	427	18	141	1	2	0	0	2	0	1338
Kaghan to Paras																
Weekday	5/4/2017	T1	Kaghan to Paras	07:00 to 08:00	4	9	17		1							31
Weekday	5/4/2017	T1	Kaghan to Paras	08:00 to 09:00	9	29	28		12							78
Weekday	5/4/2017	T1	Kaghan to Paras	09:00 to 10:00	4	27	22	2	4				1			60
Weekday	5/4/2017	T1	Kaghan to Paras	10:00 to 11:00	9	29	20		1							59
Weekday	5/4/2017	T1	Kaghan to Paras	11:00 to 12:00	3	34	19	1	6				1			64
Weekday	5/4/2017	T1	Kaghan to Paras	12:00 to 13:00	5	46	25		5	1						82
Weekday	5/4/2017	T1	Kaghan to Paras	13:00 to 14:00	7	43	22	4	13							89
Weekday	5/4/2017	T1	Kaghan to Paras	14:00 to 15:00	7	35	16		9				1			68
Weekday	5/4/2017	T1	Kaghan to Paras	15:00 to 16:00	8	50	33	1	8				1			101
Weekday	5/4/2017	T1	Kaghan to Paras	16:00 to 17:00	12	59	43		10				3			127
Weekday	5/4/2017	T1	Kaghan to Paras	17:00 to 18:00	9	40	28		9				1			87
Weekday	5/4/2017	T1	Kaghan to Paras	18:00 to 19:00	7	40	28		5				1			81
Weekday	5/4/2017	T1	Kaghan to Paras	19:00 to 20:00	8	34	15		8							65
Weekday	5/4/2017	T1	Kaghan to Paras	20:00 to 21:00	1	20	9		4	1						35
Weekday	5/4/2017	T1	Kaghan to Paras	21:00 to 22:00	3	11	9		3							26

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	5/4/2017	T1	Kaghan to Paras	22:00 to 23:00	2	12	4		2							20
Weekday	5/4/2017	T1	Kaghan to Paras	23:00 to 00:00		12	4		3							19
Weekday	5/5/2017	T1	Kaghan to Paras	00:00 to 01:00		18	8		4							30
Weekday	5/5/2017	T1	Kaghan to Paras	01:00 to 02:00		24	7		7							38
Weekday	5/5/2017	T1	Kaghan to Paras	02:00 to 03:00		14	6		4							24
Weekday	5/5/2017	T1	Kaghan to Paras	03:00 to 04:00		14	7		7							28
Weekday	5/5/2017	T1	Kaghan to Paras	04:00 to 05:00		4	1		1							6
Weekday	5/5/2017	T1	Kaghan to Paras	05:00 to 06:00		8	3		2							13
Weekday	5/5/2017	T1	Kaghan to Paras	06:00 to 07:00		11	10		3							24
					98	623	384	8	131	2	0	0	0	9	0	1255
Paras to Kaghan																
Weekend	5/7/2017	T1	Paras to Kaghan	07:00 to 08:00	4	19	11	1	6							41
Weekend	5/7/2017	T1	Paras to Kaghan	08:00 to 09:00	7	43	19		9							78
Weekend	5/7/2017	T1	Paras to Kaghan	09:00 to 10:00	16	50	40	1	20							127
Weekend	5/7/2017	T1	Paras to Kaghan	10:00 to 11:00	14	56	38	4	12	1				1		126
Weekend	5/7/2017	T1	Paras to Kaghan	11:00 to 12:00	22	55	33	5	9					1		125
Weekend	5/7/2017	T1	Paras to Kaghan	12:00 to 13:00	16	64	21		5							106
Weekend	5/7/2017	T1	Paras to Kaghan	13:00 to 14:00	13	43	23	2	3							84
Weekend	5/7/2017	T1	Paras to Kaghan	14:00 to 15:00	11	45	29		8					1		94
Weekend	5/7/2017	T1	Paras to Kaghan	15:00 to 16:00	14	48	38	2	12							114
Weekend	5/7/2017	T1	Paras to Kaghan	16:00 to 17:00	11	42	38	1	4							96

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	5/7/2017	T1	Paras to Kaghan	17:00 to 18:00	11	44	38	3	5							101
Weekend	5/7/2017	T1	Paras to Kaghan	18:00 to 19:00	16	47	40	3	10	2						118
Weekend	5/7/2017	T1	Paras to Kaghan	19:00 to 20:00	11	52	33	8	4							108
Weekend	5/7/2017	T1	Paras to Kaghan	20:00 to 21:00	1	28	21		3	2						55
Weekend	5/7/2017	T1	Paras to Kaghan	21:00 to 22:00	11	24	20		1							56
Weekend	5/7/2017	T1	Paras to Kaghan	22:00 to 23:00	7	18	12	1	6							44
Weekend	5/7/2017	T1	Paras to Kaghan	23:00 to 00:00		14	13		4							31
Weekend	5/8/2017	T1	Paras to Kaghan	00:00 to 01:00		13	13		4							30
Weekend	5/8/2017	T1	Paras to Kaghan	01:00 to 02:00		11	7		1							19
Weekend	5/8/2017	T1	Paras to Kaghan	02:00 to 03:00		11	6		3							20
Weekend	5/8/2017	T1	Paras to Kaghan	03:00 to 04:00		10	6		4							20
Weekend	5/8/2017	T1	Paras to Kaghan	04:00 to 05:00		11	6		3							20
Weekend	5/8/2017	T1	Paras to Kaghan	05:00 to 06:00	1	12	4		3	2						22
Weekend	5/8/2017	T1	Paras to Kaghan	06:00 to 07:00	3	15	12		5							35
					189	775	521	31	144	7	0	0	0	3	0	1670
Kaghan to Paras																
Weekend	5/7/2017	T1	Kaghan to Paras	07:00 to 08:00	5	6	19		13							43
Weekend	5/7/2017	T1	Kaghan to Paras	08:00 to 09:00	8	28	26		5							67
Weekend	5/7/2017	T1	Kaghan to Paras	09:00 to 10:00	8	41	25		4							78
Weekend	5/7/2017	T1	Kaghan to Paras	10:00 to 11:00	13	59	38	4	4							118
Weekend	5/7/2017	T1	Kaghan to Paras	11:00 to 12:00	13	60	29	3	9					1		115

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	5/7/2017	T1	Kaghan to Paras	12:00 to 13:00	15	62	25	7	22							131
Weekend	5/7/2017	T1	Kaghan to Paras	13:00 to 14:00	7	67	32	2	5							113
Weekend	5/7/2017	T1	Kaghan to Paras	14:00 to 15:00	9	46	23	1	4							83
Weekend	5/7/2017	T1	Kaghan to Paras	15:00 to 16:00	9	69	26	1	10							115
Weekend	5/7/2017	T1	Kaghan to Paras	16:00 to 17:00	12	65	23	2	6							108
Weekend	5/7/2017	T1	Kaghan to Paras	17:00 to 18:00	6	62	30	3	13							114
Weekend	5/7/2017	T1	Kaghan to Paras	18:00 to 19:00	20	62	44	1	8							135
Weekend	5/7/2017	T1	Kaghan to Paras	19:00 to 20:00	5	67	24	3	5		1					105
Weekend	5/7/2017	T1	Kaghan to Paras	20:00 to 21:00		26	11	2	2							41
Weekend	5/7/2017	T1	Kaghan to Paras	21:00 to 22:00	9	26	20	1	10							66
Weekend	5/7/2017	T1	Kaghan to Paras	22:00 to 23:00	8	15	12		9							44
Weekend	5/7/2017	T1	Kaghan to Paras	23:00 to 00:00		13	7		2							22
Weekend	5/8/2017	T1	Kaghan to Paras	00:00 to 01:00		10	12		2							24
Weekend	5/8/2017	T1	Kaghan to Paras	01:00 to 02:00		12	8		4	1						25
Weekend	5/8/2017	T1	Kaghan to Paras	02:00 to 03:00		11	7		7	1						26
Weekend	5/8/2017	T1	Kaghan to Paras	03:00 to 04:00		7	3		5							15
Weekend	5/8/2017	T1	Kaghan to Paras	04:00 to 05:00		7	4		3							14
Weekend	5/8/2017	T1	Kaghan to Paras	05:00 to 06:00	2	12	11		5							30
Weekend	5/8/2017	T1	Kaghan to Paras	06:00 to 07:00		13	7									20
					149	846	466	30	157	2	1	0	0	1	0	1652

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Sendhori to Paras																
Weekday	4/5/2017	T2	Sendhori to Paras	07:00 to 08:00	6	9	12		7	1						35
Weekday	4/5/2017	T2	Sendhori to Paras	08:00 to 09:00	6	15	24		12							57
Weekday	4/5/2017	T2	Sendhori to Paras	09:00 to 10:00	4	23	32	3	4	2						68
Weekday	4/5/2017	T2	Sendhori to Paras	10:00 to 11:00	6	35	37		9							87
Weekday	4/5/2017	T2	Sendhori to Paras	11:00 to 12:00	6	39	35	7	9							96
Weekday	4/5/2017	T2	Sendhori to Paras	12:00 to 13:00	5	40	32	2	5							84
Weekday	4/5/2017	T2	Sendhori to Paras	13:00 to 14:00	6	32	21	4	1							64
Weekday	4/5/2017	T2	Sendhori to Paras	14:00 to 15:00	5	40	23	3	1							72
Weekday	4/5/2017	T2	Sendhori to Paras	15:00 to 16:00	4	32	25	4								65
Weekday	4/5/2017	T2	Sendhori to Paras	16:00 to 17:00	7	36	18		3				1			65
Weekday	4/5/2017	T2	Sendhori to Paras	17:00 to 18:00	8	30	26		3							67
Weekday	4/5/2017	T2	Sendhori to Paras	18:00 to 19:00	3	35	17	1	2	2						60
Weekday	4/5/2017	T2	Sendhori to Paras	19:00 to 20:00	12	30	30	2	4							78
Weekday	4/5/2017	T2	Sendhori to Paras	20:00 to 21:00	7	25	9		4							45
Weekday	4/5/2017	T2	Sendhori to Paras	21:00 to 22:00	2	12	17		8							39
Weekday	4/5/2017	T2	Sendhori to Paras	22:00 to 23:00	3	14	2		2							21
Weekday	4/5/2017	T2	Sendhori to Paras	23:00 to 00:00		3	5		3							11
Weekday	5/5/2017	T2	Sendhori to Paras	00:00 to 01:00		8	13		5							26
Weekday	5/5/2017	T2	Sendhori to Paras	01:00 to 02:00	1	1	9		7							18
Weekday	5/5/2017	T2	Sendhori to Paras	02:00 to 03:00		9			4							13

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	5/5/2017	T2	Sendhori to Paras	03:00 to 04:00		2	10		5							17
Weekday	5/5/2017	T2	Sendhori to Paras	04:00 to 05:00		2	6		5							13
Weekday	5/5/2017	T2	Sendhori to Paras	05:00 to 06:00	1	5	3		4							13
Weekday	5/5/2017	T2	Sendhori to Paras	06:00 to 07:00	4	16	16		7							43
					96	493	422	26	114	5	-	-	-	1	-	1157
Paras to Sendhori																
Weekday	4/5/2017	T2	Paras to Sendhori	07:00 to 08:00	1	7	14		2							24
Weekday	4/5/2017	T2	Paras to Sendhori	08:00 to 09:00	3	21	22		9							55
Weekday	4/5/2017	T2	Paras to Sendhori	09:00 to 10:00	5	22	28	2	6	1						64
Weekday	4/5/2017	T2	Paras to Sendhori	10:00 to 11:00	2	33	18		1							54
Weekday	4/5/2017	T2	Paras to Sendhori	11:00 to 12:00	6	26	16	1	1				2			52
Weekday	4/5/2017	T2	Paras to Sendhori	12:00 to 13:00	6	36	22		8	1						73
Weekday	4/5/2017	T2	Paras to Sendhori	13:00 to 14:00	9	42	16	1	3							71
Weekday	4/5/2017	T2	Paras to Sendhori	14:00 to 15:00	4	45	21		8				3			81
Weekday	4/5/2017	T2	Paras to Sendhori	15:00 to 16:00	6	32	30	3	7				1			79
Weekday	4/5/2017	T2	Paras to Sendhori	16:00 to 17:00	5	40	24		12							81
Weekday	4/5/2017	T2	Paras to Sendhori	17:00 to 18:00	3	28	24		12							67
Weekday	4/5/2017	T2	Paras to Sendhori	18:00 to 19:00	7	38	29		6				1			81
Weekday	4/5/2017	T2	Paras to Sendhori	19:00 to 20:00	5	33	17		3				1			59
Weekday	4/5/2017	T2	Paras to Sendhori	20:00 to 21:00	3	15	14		5							37
Weekday	4/5/2017	T2	Paras to Sendhori	21:00 to 22:00	4	7	10		3							24

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	4/5/2017	T2	Paras to Sendhori	22:00 to 23:00		16	5		2							23
Weekday	4/5/2017	T2	Paras to Sendhori	23:00 to 00:00		6	2		1							9
Weekday	4/5/2017	T2	Paras to Sendhori	00:00 to 01:00		5	2		1							8
Weekday	4/5/2017	T2	Paras to Sendhori	01:00 to 02:00		2	2									4
Weekday	4/5/2017	T2	Paras to Sendhori	02:00 to 03:00		2	2			1						5
Weekday	4/5/2017	T2	Paras to Sendhori	03:00 to 04:00		2	3		2							7
Weekday	4/5/2017	T2	Paras to Sendhori	04:00 to 05:00			3		1							4
Weekday	4/5/2017	T2	Paras to Sendhori	05:00 to 06:00		3	1									4
Weekday	4/5/2017	T2	Paras to Sendhori	06:00 to 07:00	2	18	16	3	2							41
					71	479	341	10	95	3	-	-	-	8	-	1007
Sendhori to Paras																
Weekend	7/5/2017	T2	Sendhori to Paras	07:00 to 08:00	3	14	18		6							41
Weekend	7/5/2017	T2	Sendhori to Paras	08:00 to 09:00	13	36	26	2	15							92
Weekend	7/5/2017	T2	Sendhori to Paras	09:00 to 10:00	7	52	42	3	12				2			118
Weekend	7/5/2017	T2	Sendhori to Paras	10:00 to 11:00	19	43	32	1	7					1		103
Weekend	7/5/2017	T2	Sendhori to Paras	11:00 to 12:00	14	53	24	1	5				1			98
Weekend	7/5/2017	T2	Sendhori to Paras	12:00 to 13:00	14	42	28	1	2							87
Weekend	7/5/2017	T2	Sendhori to Paras	13:00 to 14:00	9	44	23	6					1			83
Weekend	7/5/2017	T2	Sendhori to Paras	14:00 to 15:00	12	44	22		2				1			81
Weekend	7/5/2017	T2	Sendhori to Paras	15:00 to 16:00	5	42	28									75
Weekend	7/5/2017	T2	Sendhori to Paras	16:00 to 17:00	12	32	27		4							75

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	7/5/2017	T2	Sendhori to Paras	17:00 to 18:00	7	32	14		2	1						56
Weekend	7/5/2017	T2	Sendhori to Paras	18:00 to 19:00	5	42	20	1	3	2						73
Weekend	7/5/2017	T2	Sendhori to Paras	19:00 to 20:00	6	26	16	2	4							54
Weekend	7/5/2017	T2	Sendhori to Paras	20:00 to 21:00	16	20	7	4	3				1			51
Weekend	7/5/2017	T2	Sendhori to Paras	21:00 to 22:00		12	12		2	1						27
Weekend	7/5/2017	T2	Sendhori to Paras	22:00 to 23:00		7	6		3							16
Weekend	7/5/2017	T2	Sendhori to Paras	23:00 to 00:00		8	6		4				1			19
Weekend	8/5/2017	T2	Sendhori to Paras	00:00 to 01:00		6	8		4							18
Weekend	8/5/2017	T2	Sendhori to Paras	01:00 to 02:00		4	3		1							8
Weekend	8/5/2017	T2	Sendhori to Paras	02:00 to 03:00	2	5	4									11
Weekend	8/5/2017	T2	Sendhori to Paras	03:00 to 04:00		8	3									11
Weekend	8/5/2017	T2	Sendhori to Paras	04:00 to 05:00		6	2		1							9
Weekend	8/5/2017	T2	Sendhori to Paras	05:00 to 06:00	1	1	2		2	3						9
Weekend	8/5/2017	T2	Sendhori to Paras	06:00 to 07:00	4	21	16		7							48
					149	600	389	21	89	7	-	-	-	7	1	1263
Paras to Sendhori																
Weekend	7/5/2017	T2	Paras to Sendhori	07:00 to 08:00	1	8	12		3							24
Weekend	7/5/2017	T2	Paras to Sendhori	08:00 to 09:00	4	17	25		10							56
Weekend	7/5/2017	T2	Paras to Sendhori	09:00 to 10:00	5	24	26		5							60
Weekend	7/5/2017	T2	Paras to Sendhori	10:00 to 11:00	9	38	32	1	5							85
Weekend	7/5/2017	T2	Paras to Sendhori	11:00 to 12:00	2	41	24	3	3							73

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	7/5/2017	T2	Paras to Sendhori	12:00 to 13:00	6	52	31	7	5					1		102
Weekend	7/5/2017	T2	Paras to Sendhori	13:00 to 14:00	9	65	34		15							123
Weekend	7/5/2017	T2	Paras to Sendhori	14:00 to 15:00	4	72	40	2	8	1						127
Weekend	7/5/2017	T2	Paras to Sendhori	15:00 to 16:00	15	62	20	2	3							102
Weekend	7/5/2017	T2	Paras to Sendhori	16:00 to 17:00	15	67	20		15							117
Weekend	7/5/2017	T2	Paras to Sendhori	17:00 to 18:00	10	69	34		12							125
Weekend	7/5/2017	T2	Paras to Sendhori	18:00 to 19:00	18	82	27	2	9	2						140
Weekend	7/5/2017	T2	Paras to Sendhori	19:00 to 20:00	13	41	32	9	7		1					103
Weekend	7/5/2017	T2	Paras to Sendhori	20:00 to 21:00	14	52	22	9	11							108
Weekend	7/5/2017	T2	Paras to Sendhori	21:00 to 22:00	13	20	9	5	6				1			54
Weekend	7/5/2017	T2	Paras to Sendhori	22:00 to 23:00	1	10	4	1	9							25
Weekend	7/5/2017	T2	Paras to Sendhori	23:00 to 00:00	2	8	11		1	1						23
Weekend	8/5/2017	T2	Paras to Sendhori	00:00 to 01:00		16	4		2							22
Weekend	8/5/2017	T2	Paras to Sendhori	01:00 to 02:00	1	5	4		2							12
Weekend	8/5/2017	T2	Paras to Sendhori	02:00 to 03:00		3	2		6							11
Weekend	8/5/2017	T2	Paras to Sendhori	03:00 to 04:00	1	3	4		8	1						17
Weekend	8/5/2017	T2	Paras to Sendhori	04:00 to 05:00		2			1							3
Weekend	8/5/2017	T2	Paras to Sendhori	05:00 to 06:00	1	6	2		3							12
Weekend	8/5/2017	T2	Paras to Sendhori	06:00 to 07:00	3	13	8		7							31
					147	776	427	41	156	5	1	-	-	2	-	1555

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailor	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Balakot to Dabrian																
Weekday	5/5/2017	T3	Balakot to Dabrian	07:00 to 08:00	36	73	23	8	9	1						150
Weekday	5/5/2017	T3	Balakot to Dabrian	08:00 to 09:00	296	100	23	1	7				1			428
Weekday	5/5/2017	T3	Balakot to Dabrian	09:00 to 10:00	66	129	47	3	12	1			1			259
Weekday	5/5/2017	T3	Balakot to Dabrian	10:00 to 11:00	73	153	57	3	9	1			2			298
Weekday	5/5/2017	T3	Balakot to Dabrian	11:00 to 12:00	90	200	158	3					1			452
Weekday	5/5/2017	T3	Balakot to Dabrian	12:00 to 13:00	91	181	52	3	5				1			333
Weekday	5/5/2017	T3	Balakot to Dabrian	13:00 to 14:00	60	116	38	3	1				1			219
Weekday	5/5/2017	T3	Balakot to Dabrian	14:00 to 15:00	75	123	30		2							230
Weekday	5/5/2017	T3	Balakot to Dabrian	15:00 to 16:00	97	122	61	4	3				2			289
Weekday	5/5/2017	T3	Balakot to Dabrian	16:00 to 17:00	78	157	43		9							287
Weekday	5/5/2017	T3	Balakot to Dabrian	17:00 to 18:00	83	143	41	2	1							270
Weekday	5/5/2017	T3	Balakot to Dabrian	18:00 to 19:00	78	121	37		5							241
Weekday	5/5/2017	T3	Balakot to Dabrian	19:00 to 20:00	105	137	35	1	11							289
Weekday	5/5/2017	T3	Balakot to Dabrian	20:00 to 21:00	60	99	23	1	2							185
Weekday	5/5/2017	T3	Balakot to Dabrian	21:00 to 22:00	45	43	14		1							103
Weekday	5/5/2017	T3	Balakot to Dabrian	22:00 to 23:00	19	45	25									89
Weekday	5/5/2017	T3	Balakot to Dabrian	23:00 to 00:00	14	36	29									79
Weekday	5/6/2017	T3	Balakot to Dabrian	00:00 to 01:00	6	26	12		3	2						49
Weekday	5/6/2017	T3	Balakot to Dabrian	01:00 to 02:00	11	21	13		2	3						50
Weekday	5/6/2017	T3	Balakot to Dabrian	02:00 to 03:00	2	22	8		17	2						51

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	5/6/2017	T3	Balakot to Dabrian	03:00 to 04:00		16	7		2	1						26
Weekday	5/6/2017	T3	Balakot to Dabrian	04:00 to 05:00		8	6		1	1						16
Weekday	5/6/2017	T3	Balakot to Dabrian	05:00 to 06:00		20	7		1	1						29
Weekday	5/6/2017	T3	Balakot to Dabrian	06:00 to 07:00	22	38	20	2	5							87
					1,407	2,129	809	34	108	13	-	-	-	9	-	4509
Balakot to Dabrian																
Weekend	5/7/2017	T3	Balakot to Dabrian	07:00 to 08:00	63	69	45	2	13	2						194
Weekend	5/7/2017	T3	Balakot to Dabrian	08:00 to 09:00	79	128	75	5	11				2			300
Weekend	5/7/2017	T3	Balakot to Dabrian	09:00 to 10:00	84	142	71	6	18	3			5			329
Weekend	5/7/2017	T3	Balakot to Dabrian	10:00 to 11:00	97	127	71	2	4				3			304
Weekend	5/7/2017	T3	Balakot to Dabrian	11:00 to 12:00	124	172	67	3	6				3			375
Weekend	5/7/2017	T3	Balakot to Dabrian	12:00 to 13:00	105	148	70	2	6				3			334
Weekend	5/7/2017	T3	Balakot to Dabrian	13:00 to 14:00	104	109	80		5				2			300
Weekend	5/7/2017	T3	Balakot to Dabrian	14:00 to 15:00	91	129	69	20	1				3			313
Weekend	5/7/2017	T3	Balakot to Dabrian	15:00 to 16:00	79	123	75	3	10	1			1			292
Weekend	5/7/2017	T3	Balakot to Dabrian	16:00 to 17:00	121	138	38	2	7	2						308
Weekend	5/7/2017	T3	Balakot to Dabrian	17:00 to 18:00	88	127	48	7	3				2			275
Weekend	5/7/2017	T3	Balakot to Dabrian	18:00 to 19:00	93	130	29		13				2			267
Weekend	5/7/2017	T3	Balakot to Dabrian	19:00 to 20:00	119	146	68		4				3			340
Weekend	5/7/2017	T3	Balakot to Dabrian	20:00 to 21:00	133	175	71	3	13	1						396
Weekend	5/7/2017	T3	Balakot to Dabrian	21:00 to 22:00	63	134	60		10	2						269
Weekend	5/7/2017	T3	Balakot to Dabrian	22:00 to 23:00	63	100	51		6	2						222

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	5/7/2017	T3	Balakot to Dabrian	23:00 to 00:00	34	63	33		7	1						138
Weekend	5/8/2017	T3	Balakot to Dabrian	00:00 to 01:00	17	54	31		5							107
Weekend	5/8/2017	T3	Balakot to Dabrian	01:00 to 02:00	10	32	17		9	3						71
Weekend	5/8/2017	T3	Balakot to Dabrian	02:00 to 03:00	4	18	17		4							43
Weekend	5/8/2017	T3	Balakot to Dabrian	03:00 to 04:00	2	26	23		4							55
Weekend	5/8/2017	T3	Balakot to Dabrian	04:00 to 05:00	4	19	8		4							35
Weekend	5/8/2017	T3	Balakot to Dabrian	05:00 to 06:00	13	38	16		7							74
Weekend	5/8/2017	T3	Balakot to Dabrian	06:00 to 07:00	35	115	62	2	9	3						226
					1,625	2,462	1,195	57	179	20	-	-	-	29	-	5567
Dabrian to Balakot																
Weekday	5/5/2017	T3	Dabrian to Balakot	07:00 to 08:00	52	89	27	1	1							170
Weekday	5/5/2017	T3	Dabrian to Balakot	08:00 to 09:00	51	78	40	3	1							173
Weekday	5/5/2017	T3	Dabrian to Balakot	09:00 to 10:00	69	110	41	2	1				1			224
Weekday	5/5/2017	T3	Dabrian to Balakot	10:00 to 11:00	55	108	37	5	2				3			210
Weekday	5/5/2017	T3	Dabrian to Balakot	11:00 to 12:00	65	137	49	4	4	1						260
Weekday	5/5/2017	T3	Dabrian to Balakot	12:00 to 13:00	52	138	35	4					3			232
Weekday	5/5/2017	T3	Dabrian to Balakot	13:00 to 14:00	63	98	27		6							194
Weekday	5/5/2017	T3	Dabrian to Balakot	14:00 to 15:00	61	105	36	7	1							210
Weekday	5/5/2017	T3	Dabrian to Balakot	15:00 to 16:00	71	109	37	3	5				1			226
Weekday	5/5/2017	T3	Dabrian to Balakot	16:00 to 17:00	58	130	39		11							238
Weekday	5/5/2017	T3	Dabrian to Balakot	17:00 to 18:00	105	176	30	2	12							325
Weekday	5/5/2017	T3	Dabrian to Balakot	18:00 to 19:00	72	164	33		24							293

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	5/5/2017	T3	Dabrian to Balakot	19:00 to 20:00	69	122	23		7							221
Weekday	5/5/2017	T3	Dabrian to Balakot	20:00 to 21:00	29	28	22	2	4	1						86
Weekday	5/5/2017	T3	Dabrian to Balakot	21:00 to 22:00	17	42	9		4							72
Weekday	5/5/2017	T3	Dabrian to Balakot	22:00 to 23:00	2	13	3									18
Weekday	5/5/2017	T3	Dabrian to Balakot	23:00 to 00:00		6	3		1							10
Weekday	5/6/2017	T3	Dabrian to Balakot	00:00 to 01:00	1	8	2									11
Weekday	5/6/2017	T3	Dabrian to Balakot	01:00 to 02:00		3	2		2							7
Weekday	5/6/2017	T3	Dabrian to Balakot	02:00 to 03:00		5	4		2							11
Weekday	5/6/2017	T3	Dabrian to Balakot	03:00 to 04:00		4	1									5
Weekday	5/6/2017	T3	Dabrian to Balakot	04:00 to 05:00		4	3		2							9
Weekday	5/6/2017	T3	Dabrian to Balakot	05:00 to 06:00	3	10	5		4							22
Weekday	5/6/2017	T3	Dabrian to Balakot	06:00 to 07:00	26	40	21	1	3							91
					921	1,727	529	34	97	2	-	-	-	8	-	3318
Dabrian to Balakot																
Weekend	5/7/2017	T3	Dabrian to Balakot	07:00 to 08:00	60	71	37	1	2					1		172
Weekend	5/7/2017	T3	Dabrian to Balakot	08:00 to 09:00	75	190	65		11					1		342
Weekend	5/7/2017	T3	Dabrian to Balakot	09:00 to 10:00	56	101	69		16	1				7		250
Weekend	5/7/2017	T3	Dabrian to Balakot	10:00 to 11:00	80	123	48		6	1				2		260
Weekend	5/7/2017	T3	Dabrian to Balakot	11:00 to 12:00	47	144	49	2	8					1		251
Weekend	5/7/2017	T3	Dabrian to Balakot	12:00 to 13:00	37	110	36	1	4					1		189
Weekend	5/7/2017	T3	Dabrian to Balakot	13:00 to 14:00	62	147	45	6	23					2		285
Weekend	5/7/2017	T3	Dabrian to Balakot	14:00 to 15:00	88	139	68		15	1				4		315

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	5/7/2017	T3	Dabrian to Balakot	15:00 to 16:00	46	310	45	7	4							412
Weekend	5/7/2017	T3	Dabrian to Balakot	16:00 to 17:00	91	162	65		13				2			333
Weekend	5/7/2017	T3	Dabrian to Balakot	17:00 to 18:00	46	133	35	4	11				1			230
Weekend	5/7/2017	T3	Dabrian to Balakot	18:00 to 19:00	67	166	60		20				1			314
Weekend	5/7/2017	T3	Dabrian to Balakot	19:00 to 20:00	61	118	35	6	6							226
Weekend	5/7/2017	T3	Dabrian to Balakot	20:00 to 21:00	131	146	59		24	2						362
Weekend	5/7/2017	T3	Dabrian to Balakot	21:00 to 22:00	36	113	41	3	2							195
Weekend	5/7/2017	T3	Dabrian to Balakot	22:00 to 23:00	23	63	40	1	2	1						130
Weekend	5/7/2017	T3	Dabrian to Balakot	23:00 to 00:00	27	65	43	1	2							138
Weekend	5/8/2017	T3	Dabrian to Balakot	00:00 to 01:00	6	38	19		5							68
Weekend	5/8/2017	T3	Dabrian to Balakot	01:00 to 02:00	2	23	18		2	1						46
Weekend	5/8/2017	T3	Dabrian to Balakot	02:00 to 03:00		14	11		3							28
Weekend	5/8/2017	T3	Dabrian to Balakot	03:00 to 04:00		11	8	1	2							22
Weekend	5/8/2017	T3	Dabrian to Balakot	04:00 to 05:00		17	11		5							33
Weekend	5/8/2017	T3	Dabrian to Balakot	05:00 to 06:00	1	29	21		3							54
Weekend	5/8/2017	T3	Dabrian to Balakot	06:00 to 07:00	22	65	37	2	8				1			135
					1,064	2,498	965	35	197	7	-	-	-	24	-	4790

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailer	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Balakot to Mansehra																
Weekday	5/5/2017	T4	Balakot to Mansehra	07:00 to 08:00	12	87	22	8		5						134
Weekday	5/5/2017	T4	Balakot to Mansehra	08:00 to 09:00	27	117	30	2	1	2						179
Weekday	5/5/2017	T4	Balakot to Mansehra	09:00 to 10:00	40	153	56	3	6	2				2		262
Weekday	5/5/2017	T4	Balakot to Mansehra	10:00 to 11:00	44	102	33	2	1	3				1		186
Weekday	5/5/2017	T4	Balakot to Mansehra	11:00 to 12:00	61	152	39	4	5	2						263
Weekday	5/5/2017	T4	Balakot to Mansehra	12:00 to 13:00	51	144	32			1				1		229
Weekday	5/5/2017	T4	Balakot to Mansehra	13:00 to 14:00	37	151	42	1	2					2		235
Weekday	5/5/2017	T4	Balakot to Mansehra	14:00 to 15:00	53	145	39		2	1				1		241
Weekday	5/5/2017	T4	Balakot to Mansehra	15:00 to 16:00	67	103	35	3	8							216
Weekday	5/5/2017	T4	Balakot to Mansehra	16:00 to 17:00	45	136	26		4							211
Weekday	5/5/2017	T4	Balakot to Mansehra	17:00 to 18:00	95	157	25	2	5	2						286
Weekday	5/5/2017	T4	Balakot to Mansehra	18:00 to 19:00	66	135	26		10	1						238
Weekday	5/5/2017	T4	Balakot to Mansehra	19:00 to 20:00	26	103	18		3							150
Weekday	5/5/2017	T4	Balakot to Mansehra	20:00 to 21:00	29	72	23	22		1	1					148
Weekday	5/5/2017	T4	Balakot to Mansehra	21:00 to 22:00	16	28	10	1		1						56
Weekday	5/5/2017	T4	Balakot to Mansehra	22:00 to 23:00	8	24	8		2	1						43
Weekday	5/5/2017	T4	Balakot to Mansehra	23:00 to 00:00	3	19	5		1							28
Weekday	5/6/2017	T4	Balakot to Mansehra	00:00 to 01:00	2	20	4									26
Weekday	5/6/2017	T4	Balakot to Mansehra	01:00 to 02:00	2	14	2		1							19
Weekday	5/6/2017	T4	Balakot to Mansehra	02:00 to 03:00		7	2		1							10

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailor	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	5/6/2017	T4	Balakot to Mansehra	03:00 to 04:00	1	5	3		2							11
Weekday	5/6/2017	T4	Balakot to Mansehra	04:00 to 05:00		6	2		1							9
Weekday	5/6/2017	T4	Balakot to Mansehra	05:00 to 06:00	3	8	10		2							23
Weekday	5/6/2017	T4	Balakot to Mansehra	06:00 to 07:00	8	39	7	2	2							58
					696	1,927	499	50	59	22	1	-	-	7	-	3,261
Mansehra to Balakot																
Weekday	5/5/2017	T4	Mansehra to Balakot	07:00 to 08:00	56	132	49	10	14					3		264
Weekday	5/5/2017	T4	Mansehra to Balakot	08:00 to 09:00	38	104	37	3	7					2		191
Weekday	5/5/2017	T4	Mansehra to Balakot	09:00 to 10:00	103	163	71	5	11					2		355
Weekday	5/5/2017	T4	Mansehra to Balakot	10:00 to 11:00	59	101	55	6	3	2						226
Weekday	5/5/2017	T4	Mansehra to Balakot	11:00 to 12:00	98	259	95	6	2							460
Weekday	5/5/2017	T4	Mansehra to Balakot	12:00 to 13:00	86	201	98	2	3					2		392
Weekday	5/5/2017	T4	Mansehra to Balakot	13:00 to 14:00	74	139	70	2	3							288
Weekday	5/5/2017	T4	Mansehra to Balakot	14:00 to 15:00	92	170	73	2	3					2		342
Weekday	5/5/2017	T4	Mansehra to Balakot	15:00 to 16:00	136	164	75	3	4							382
Weekday	5/5/2017	T4	Mansehra to Balakot	16:00 to 17:00	96	144	73		2	2						317
Weekday	5/5/2017	T4	Mansehra to Balakot	17:00 to 18:00	82	94	56	3	2							237
Weekday	5/5/2017	T4	Mansehra to Balakot	18:00 to 19:00	61	116	45	4	2							228
Weekday	5/5/2017	T4	Mansehra to Balakot	19:00 to 20:00	49	59	27	2	2							139
Weekday	5/5/2017	T4	Mansehra to Balakot	20:00 to 21:00	48	78	35	1	1							163
Weekday	5/5/2017	T4	Mansehra to Balakot	21:00 to 22:00	35	52	27		2							116
Weekday	5/5/2017	T4	Mansehra to Balakot	22:00 to 23:00	22	52	26		2							102
Weekday	6/5/2017	T4	Mansehra to Balakot	23:00 to 00:00	25	40	32	2	1							100

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailor	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekday	6/5/2017	T4	Mansehra to Balakot	00:00 to 01:00	11	25	14		3	2						55
Weekday	6/5/2017	T4	Mansehra to Balakot	01:00 to 02:00	4	20	10		2	3						39
Weekday	6/5/2017	T4	Mansehra to Balakot	02:00 to 03:00	3	12	9		1	3						28
Weekday	6/5/2017	T4	Mansehra to Balakot	03:00 to 04:00	4	10	10			2						26
Weekday	6/5/2017	T4	Mansehra to Balakot	04:00 to 05:00		7	4		2	1						14
Weekday	6/5/2017	T4	Mansehra to Balakot	05:00 to 06:00	3	12	12		2	1						30
Weekday	6/5/2017	T4	Mansehra to Balakot	06:00 to 07:00	24	41	41	3	2	1						112
					1,209	2,195	1,044	54	76	17	-	-	-	11	-	4,606
Balakot to Mansehra																
Weekend	7/5/2017	T4	Balakot to Mansehra	07:00 to 08:00	20	96	20	3	1							140
Weekend	7/5/2017	T4	Balakot to Mansehra	08:00 to 09:00	14	314	39	1	6	2						376
Weekend	7/5/2017	T4	Balakot to Mansehra	09:00 to 10:00	27	115	38	1	13	1						195
Weekend	7/5/2017	T4	Balakot to Mansehra	10:00 to 11:00	52	145	51		4	3				1		256
Weekend	7/5/2017	T4	Balakot to Mansehra	11:00 to 12:00	51	154	44	6	7	1				1		264
Weekend	7/5/2017	T4	Balakot to Mansehra	12:00 to 13:00	52	129	54	5	5					1		246
Weekend	7/5/2017	T4	Balakot to Mansehra	13:00 to 14:00	50	134	173	1	7					1		366
Weekend	7/5/2017	T4	Balakot to Mansehra	14:00 to 15:00	50	153	52	2	5							262
Weekend	7/5/2017	T4	Balakot to Mansehra	15:00 to 16:00	56	178	49	4	5	2	1					295
Weekend	7/5/2017	T4	Balakot to Mansehra	16:00 to 17:00	45	148	37	8	5							243
Weekend	7/5/2017	T4	Balakot to Mansehra	17:00 to 18:00	62	183	44	9	13							311
Weekend	7/5/2017	T4	Balakot to Mansehra	18:00 to 19:00	27	131	33	1	12					1		205
Weekend	7/5/2017	T4	Balakot to Mansehra	19:00 to 20:00	30	114	26	2	7					2		181
Weekend	7/5/2017	T4	Balakot to Mansehra	20:00 to 21:00	33	87	26	2	7					2		157

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailor	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	7/5/2017	T4	Balakot to Mansehra	21:00 to 22:00	30	69	25	1	3					1		129
Weekend	7/5/2017	T4	Balakot to Mansehra	22:00 to 23:00	22	42	19	3	4							90
Weekend	7/5/2017	T4	Balakot to Mansehra	23:00 to 00:00	42	65	25		2							134
Weekend	8/5/2017	T4	Balakot to Mansehra	00:00 to 01:00	19	69	18	1	2				1		110	
Weekend	8/5/2017	T4	Balakot to Mansehra	01:00 to 02:00	23	38	14	2	1						78	
Weekend	8/5/2017	T4	Balakot to Mansehra	02:00 to 03:00	10	29	10		1						50	
Weekend	8/5/2017	T4	Balakot to Mansehra	03:00 to 04:00	3	24	7	1	2						37	
Weekend	8/5/2017	T4	Balakot to Mansehra	04:00 to 05:00	4	19	9	1	3						36	
Weekend	8/5/2017	T4	Balakot to Mansehra	05:00 to 06:00	3	25	11	2	3						44	
Weekend	8/5/2017	T4	Balakot to Mansehra	06:00 to 07:00	28	88	22	4	2				1		145	
					753	2,549	846	60	120	9	1	-	-	12	-	4,350
Mansehra to Balakot																
Weekend	7/5/2017	T4	Mansehra to Balakot	07:00 to 08:00	45	98	50	3	2	1				1		200
Weekend	7/5/2017	T4	Mansehra to Balakot	08:00 to 09:00	42	107	40	6	9							204
Weekend	7/5/2017	T4	Mansehra to Balakot	09:00 to 10:00	59	92	56	2	15							224
Weekend	7/5/2017	T4	Mansehra to Balakot	10:00 to 11:00	53	137	48	2	8	2				3		253
Weekend	7/5/2017	T4	Mansehra to Balakot	11:00 to 12:00	60	135	43	1	4	1				2		246
Weekend	7/5/2017	T4	Mansehra to Balakot	12:00 to 13:00	74	134	55	2	3	2						270
Weekend	7/5/2017	T4	Mansehra to Balakot	13:00 to 14:00	73	138	51	1	5					1		269
Weekend	7/5/2017	T4	Mansehra to Balakot	14:00 to 15:00	77	151	59	2	4	2	1					296
Weekend	7/5/2017	T4	Mansehra to Balakot	15:00 to 16:00	66	149	57		6							278
Weekend	7/5/2017	T4	Mansehra to Balakot	16:00 to 17:00	53	118	49		4	1				1		226
Weekend	7/5/2017	T4	Mansehra to Balakot	17:00 to 18:00	41	134	29	4	2	1						211

	Date	Direction Number	Direction	Time	Bikes	Cars	Pick-up	Buses	Trucks					Tractors	Trailor	Total
									(2 AX)	(3 AX)	(4 AX)	(5 AX)	(6 AX)			
Weekend	7/5/2017	T4	Mansehra to Balakot	18:00 to 19:00	37	91	49		4							181
Weekend	7/5/2017	T4	Mansehra to Balakot	19:00 to 20:00	39	80	47	2	4							172
Weekend	7/5/2017	T4	Mansehra to Balakot	20:00 to 21:00	45	83	45	2	4							179
Weekend	7/5/2017	T4	Mansehra to Balakot	21:00 to 22:00	48	90	50		3							191
Weekend	7/5/2017	T4	Mansehra to Balakot	22:00 to 23:00	28	39	31	2	3	1						104
Weekend	8/5/2017	T4	Mansehra to Balakot	23:00 to 00:00	21	37	20	2	2	2						84
Weekend	8/5/2017	T4	Mansehra to Balakot	00:00 to 01:00	10	19	14		2	2						47
Weekend	8/5/2017	T4	Mansehra to Balakot	01:00 to 02:00	2	22	11			1						36
Weekend	8/5/2017	T4	Mansehra to Balakot	02:00 to 03:00	1	16	10		2	2						31
Weekend	8/5/2017	T4	Mansehra to Balakot	03:00 to 04:00	1	14	7		2							24
Weekend	8/5/2017	T4	Mansehra to Balakot	04:00 to 05:00	1	14	5	2		3						25
Weekend	8/5/2017	T4	Mansehra to Balakot	05:00 to 06:00	2	16	11	3	3	3						38
Weekend	8/5/2017	T4	Mansehra to Balakot	06:00 to 07:00	19	34	22	3	4	3						85
					897	1,948	859	39	95	27	1	-	-	8	-	3,874

Appendix H: Ecology Field Survey Plan

H.1 Objectives

The objective of the field surveys is to collect data for establishing the ecological baseline for the flora and fauna of the Study Areas. Specifically, the objectives include:

- ▶ Qualitative and quantitative assessment of terrestrial vegetation, periphyton, macro-invertebrates, fish, herpetofauna, birds, and mammals.
- ▶ Identification of key species, their relative abundances and their conservation status.
- ▶ Reports of wildlife sightings in the Study Area by the resident communities.
- ▶ Identification of any additional habitats, and microhabitats in the Study Areas.
- ▶ Analysis to further develop the basis for evaluating the potential impacts of Project-related activities on the biodiversity, specifically identification and evaluation of critical habitats and ecosystem services in the ecological Study Areas.

H.2 Study Areas and Sampling Sites

The ecological surveys will be carried out in two Study Areas, the Aquatic Study Area and the Terrestrial Study Area.

The Aquatic Study Area will be the Kunhar River and its tributaries. Only tributaries with a significant perennial flow that support breeding of fish will be sampled. The Aquatic Study Area is shown in **Exhibit H.1** and proposed sampling sites is shown in **Exhibit H.2**.

The Terrestrial Study Area will comprise of a 1 km buffer around selected locations where Project-related facilities are to be located. Sampling locations have been selected within all habitat types where project facilities will be located. Sampling location have also been selected at other sites in the Terrestrial Study Area, with representative sampling by proportion of habitat type, with Scrub Forest making up highest percentage followed by Pine Forest and then Agriculture Area. The Terrestrial Study Area is shown in **Exhibit H.3** and proposed sampling location and habitat distribution are shown in **Exhibit H.4**.

The aquatic biological resources that will be studied include:

- ▶ Fish fauna
- ▶ Macro-invertebrates
- ▶ Periphyton
- ▶ Riparian vegetation

The justification for selection of the aquatic sampling sites are provided in **Exhibit H.5**. **Exhibit H.6** provides a list of tributaries in which sampling will be carried out.

The terrestrial ecological resources include:

- ▶ Terrestrial vegetation,
- ▶ Terrestrial fauna (mammals, avifauna and herpetofauna)

The surveys will be conducted in two seasons i.e. winter and spring. The Winter Survey will be carried out in February 2017, and will include collection of data on:

- ▶ Fish, focusing on abundance in pools where large fish take refuge in the winter season
- ▶ Periphyton biomass growing on cobbles and boulders that is abundant in clear water in low flow conditions with good light penetration

Spring Survey will be conducted in May 2017 when temperature of water has risen following snow melt, flows have increased, turbidity is high, and fish are active and responding to breeding triggers. Terrestrial fauna is also active at this time, and vegetation is growing. Data collection will include;

- ▶ Fish, focusing on diversity, distribution, and breeding behavior
- ▶ Macro-invertebrates, diversity and abundance
- ▶ Riparian vegetation
- ▶ Terrestrial vegetation
- ▶ Terrestrial fauna (mammal, avifauna and herpetofauna).

The two surveys proposed, Winter and Spring, will cover the range of temperatures that the aquatic fauna experiences through the year, extending over the resting and active periods of aquatic fauna, dormant and active/growing periods of terrestrial flora and fauna. The data collected will be adequate for the purpose of the EIA.

Exhibit H.1: Aquatic Study Area

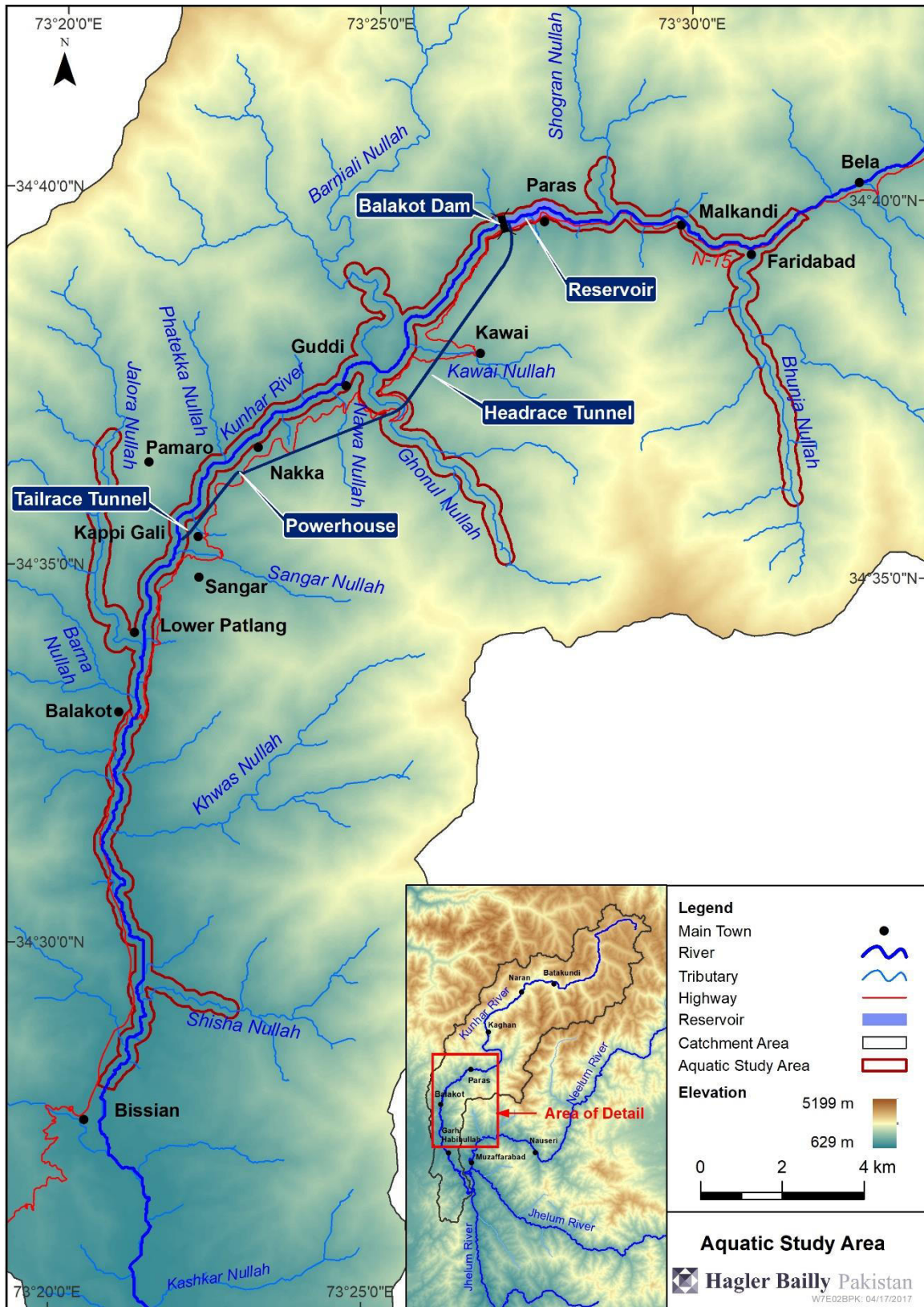


Exhibit H.2: Proposed Sampling Sites for Fish, Macro-invertebrates, Periphyton and Riparian Vegetation

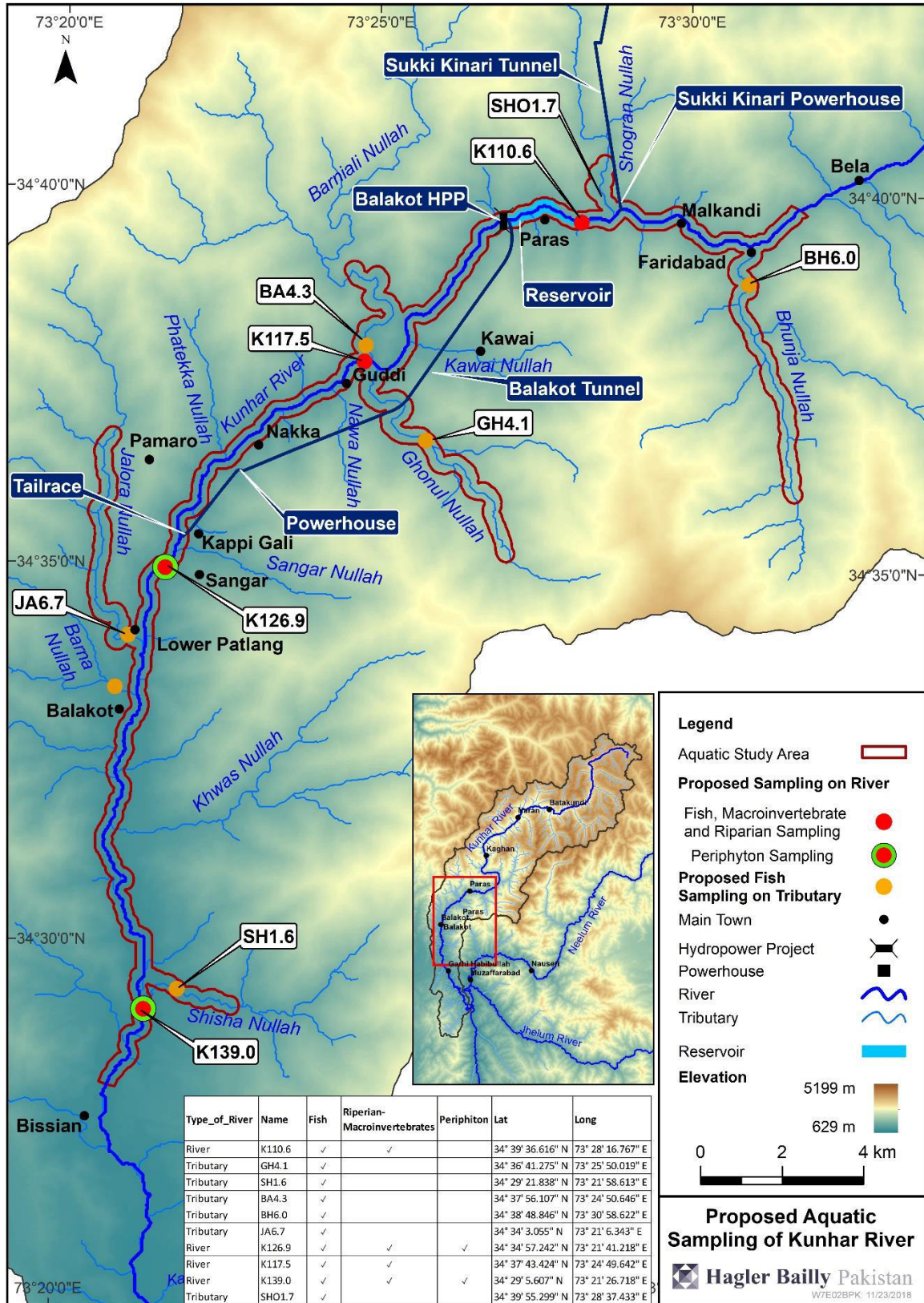


Exhibit H.3: Terrestrial Study Area

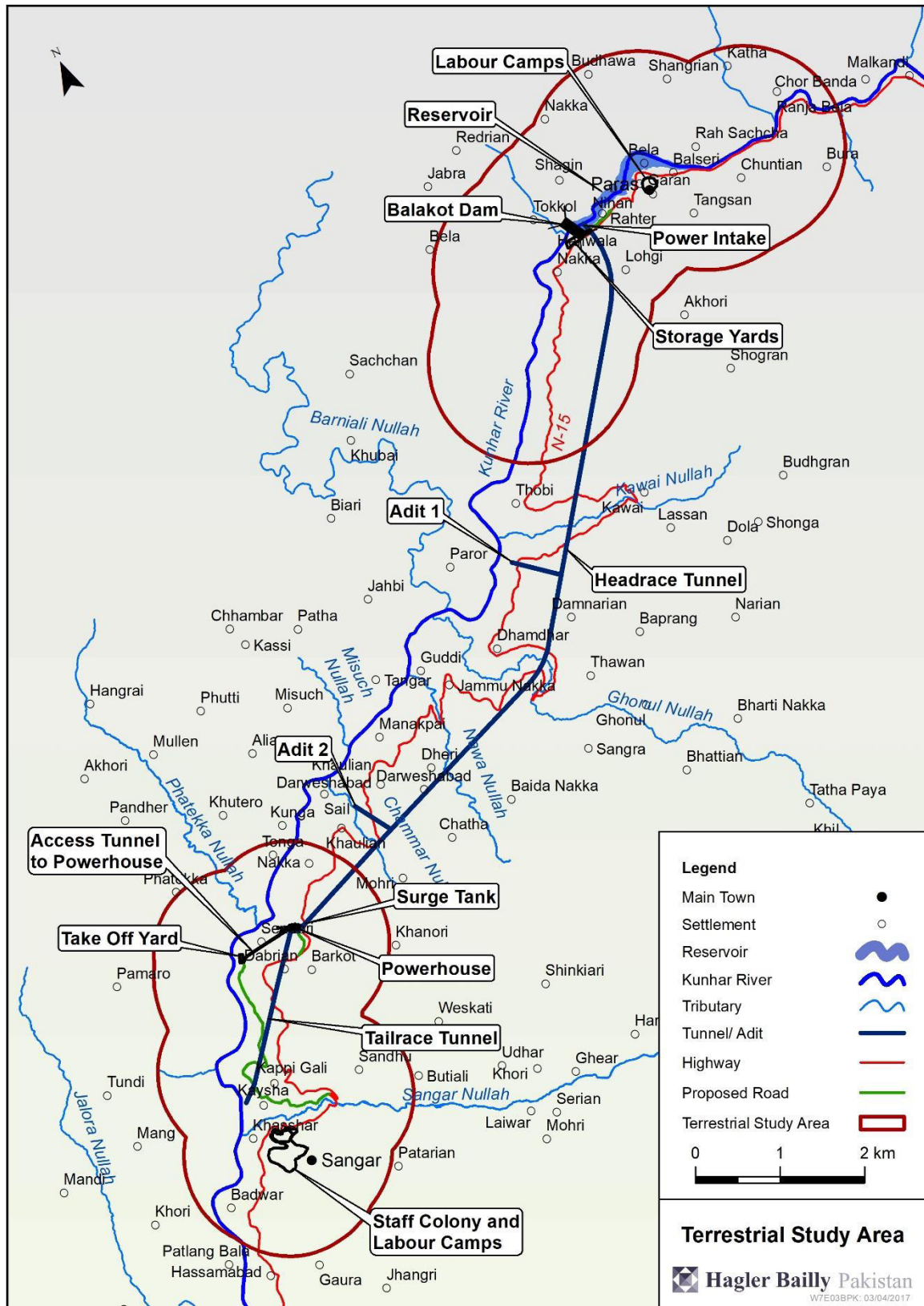


Exhibit H.4: Proposed Sampling Locations for Mammals, Birds, and Terrestrial Vegetation

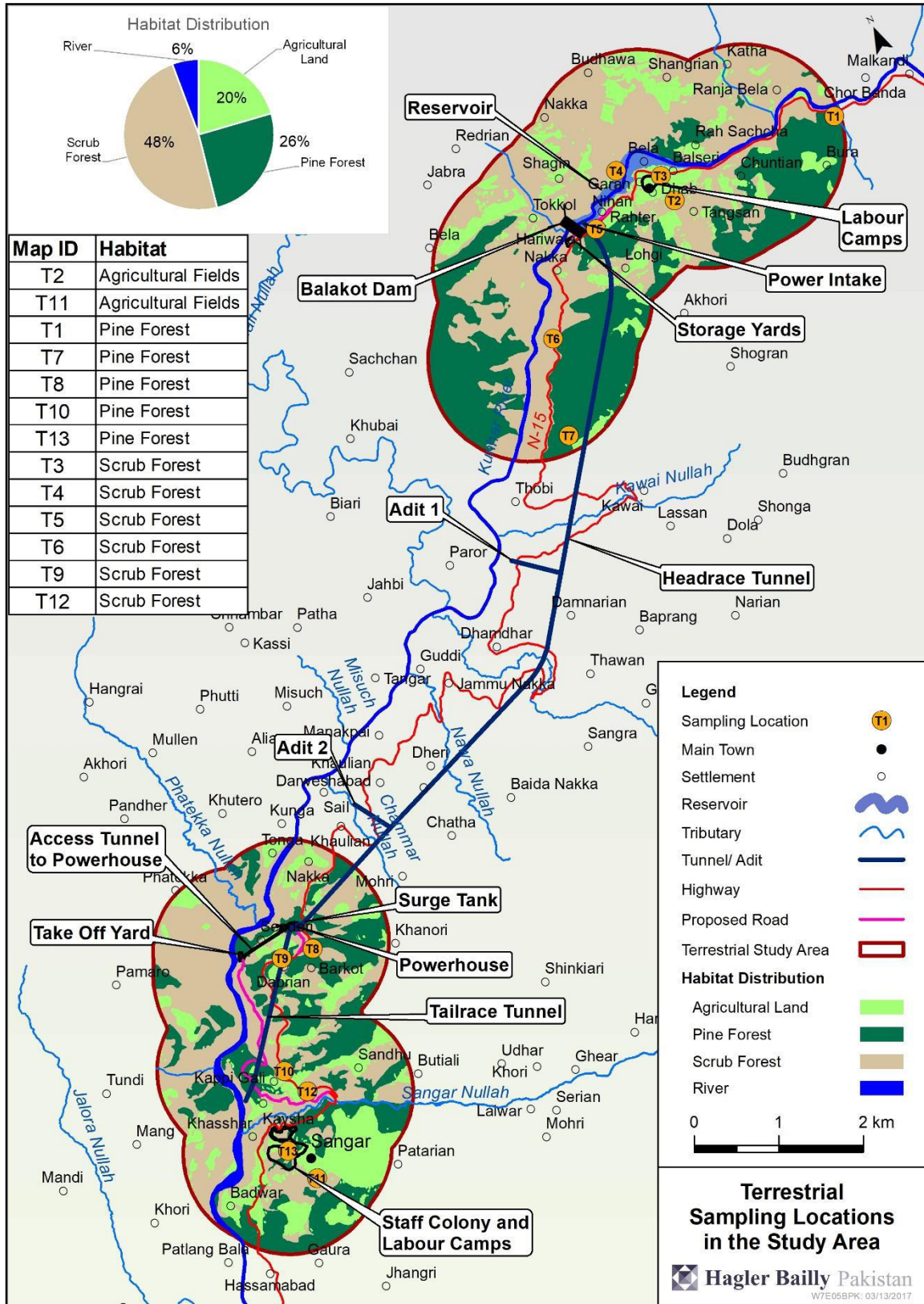


Exhibit H.5: Justifications for Selection of Sampling Sites on Main River

<i>River Segment</i>	<i>Sampling Site ID</i>	<i>Expected impacts from the Project</i>
Upstream of Dam	K110.6,	The site is located upstream of the reservoir of proposed dam and will be impacted by the barrier to migration created by the dam
Downstream of Dam	K117.5	The site will be impacted by the lower flows due to the diversion of the river flow into the power generation tunnel
Downstream of Diversion Tunnel	K126.9, K139.0	Both temperature and flow of water in this segment will be impacted by variations in flows.

Exhibit H.6: List of Sampling Sites for the Tributaries

<i>Tributary (Local Name)</i>	<i>Sampling Site ID</i>
Shogran Nullah	SH1.7
Bhunja Nullah	BH6.0
Barnialai Nullah	BA4.3
Makra Nullah	MA4.1
Barna Nullah	BAR6.7
Shisha Nullah	SH1.6

The locations of the terrestrial ecological sampling sites have been determined based on the two main terrestrial habitat types identified by *Google Earth™* satellite imagery including Agricultural Areas and Forests. Forests are further divided in to two habitat types i.e. Scrub Forest and Pine Forests. The number of sampling sites have been distributed proportionately between these habitat types within the Terrestrial Study Area, with four sampling sites in each habitat type. The habitat type of each sampling site has been provided in **Exhibit H.7**.

Exhibit H.7: Distribution of Habitat Types

<i>Relative Position of Sampling Location</i>	<i>Sampling Location IDs</i>	<i>Percentage out of Total Study Area (%)</i>
Scrub Forest	T4, T6, T9, T12, T10	48
Pine Forest	T1, T7, T8, T13	26
Agriculture Area	T2, T3, T11, T14	20
Aquatic Area	-	6

H.3 Methodology

The methodology for the field data has been prepared to collect objective data to contribute towards the determination of baseline conditions for assessments of impacts of the Project. The methods proposed have been tested in similar conditions in Poonch River located in the Jhelum Basin, as a part of baseline ecological surveys and monitoring of Gulpur Hydropower Project.

H.3.1 Fish

Fish are important components of river ecosystems because they are long-lived and integral to aquatic food webs. They are considered key indicators of environmental change because of their varied life history strategies and their sensitivity to a wide range of hydrologic and water quality conditions.^{1,2,3}

H.3.1.1 Methods for Data Collection

Fish fauna will be sampled for twice during the study i.e. Winter (February 2017) and Spring (May 2017) seasons. During winter, sampling will be conducted mainly in Kunhar River while two to three tributaries with wadeable depth and flow of water where fish are likely to be found will also be sampled.

Methods for data collection of fish will include use of two different types of nets, gill nets and cast nets, as well as electrofishing. Gill nets will be used in Winter Survey while gill nets, cast nets and electrofishing will be used in Spring Survey depending on flow of river and availability of suitable sampling locations.

Cast Nets

Fish fauna will be collected using cast nets at selected sampling sites. Two types of cast nets will be used. Mesh sizes of 25 mm and 30 mm will be used. A total of 30 castings will be carried out, 15 castings per mesh size, spread over a distance of about 90 m, depending on site conditions. The distance between adjacent sites used for cast netting will be 3 to 5 m, within the 90 m stretch.

¹ Kleynhans, C.J. 1999. The development of a fish index to assess the biological integrity of South African rivers. WATER SA-PRETORIA-, 25, 265-278.

² Karr, J.R. 1981. Assessment of biotic integrity using fish communities. Fisheries, 6, 21-27.

³ Fausch, K.D., Lyons, J., Karr, J.R. and Angermeier, P.L. 1990. Fish communities as indicators of environmental degradation. In: Adams, S. M., ed. Biological indicators of fish stress. American Fisheries Society, Symposium 8, 1990 Bethesda, Maryland.

Gill Nets

Gill nets are passive devices that are suspended in the water column and capture fish that swim into the mesh of the net. Gill nets of three different mesh sizes (50 mm, 62.5 mm and 100 mm) will be used in the main River and tributaries with enough water flow and depth that could support setting up of the gill nets. These nets will be set generally parallel to the river bank. Nets will be installed in depths in the river that just exceed the width of the net. One gill nets of above mentioned mesh sizes will be used at a sampling location.

Electrofishing

Electrofishing uses low pulses of electricity to stun fish before they are caught. Electrofishing is a common scientific survey method used to sample fish populations to determine abundance, density, and species composition. When performed correctly, electrofishing results in no permanent harm to fish, which return to their natural state in as little as two minutes after being stunned.⁴

Electrofishing will be employed for sampling in the tributaries where water levels are low and wading is possible. It is proposed that the LR-24 be used for electrofishing.⁵ Electrofishing will be carried out in a 150 m² area.

Fish sampling form is included in **Exhibit H.8**.

⁴ Fishery Research - Electrofishing National Park Service, US Department of the Interior.

⁵ Available at Smith Root, <http://www.smith-root.com/electrofishers/lr-24/>

Exhibit H.8: Survey Form - Fish

Sampling Method	<input type="checkbox"/> Gill Net	<input type="checkbox"/> Cast Net	<input type="checkbox"/> Fyke Net	<input type="checkbox"/> Electrofishing
ID	W P	Observer(s)		
Date	[dd/mm/yy]	Start Time	End Time	[HH:MM]
Direction**	Starting Coordinates	End Coordinates	Cloud Cover	%
Latitude	N	N	Wind	<input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Strong
Longitude	E	E	Precipitation	<input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
[Deg Min Sec]			Water Temperature	
River Habitats	<input type="checkbox"/> Riffles <input type="checkbox"/> Pools <input type="checkbox"/> Glides <input type="checkbox"/> Rapids	Locality		
Riverbed	<input type="checkbox"/> Others/Special Habitats _____	Mesh Size (mm)		
Depth of Riverbed	<input type="checkbox"/> Sand <input type="checkbox"/> Silt <input type="checkbox"/> Small Cobbles <input type="checkbox"/> Large Cobbles			
	<input type="checkbox"/> Boulders <input type="checkbox"/> Boulders _____			
(Please select only one box for Habitat)				
Elevation (m)	Temp. (oC)	pH	DO	Turbidity

No.	Species Name	Fish Size (cm)	Fish Weight (gms)	Tag Color ID	
				Applied	Recovered
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					

No.	Species Name	Fish Size (cm)	Fish Weight (gms)	Tag Color ID	
				Applied	Recovered
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					
31.					
32.					
33.					
34.					
35.					
36.					
37.					
38.					
39.					
40.					
41.					
42.					

H.3.1.2 Statistical Analysis

Statistical analysis will be applied to determine fish community structure and species diversity.

Fish Community Composition

The surveys will produce a list of species at each sampling site plus related information such as relative abundance (Catch per Unit Effort), fish size and weight.

Species Diversity

The species diversity will be assessed using

- ▶ Species Richness (S): total number of species

H.3.2 Macro-invertebrates

Benthic macro-invertebrates are an important part of the food chain in aquatic ecosystems, especially for fish. Many invertebrates feed on algae and bacteria, which are at the lower end of the food chain. Some shred and eat leaves and other organic matter that enters or is produced in the water. Because of their abundance and position as ‘intermediaries’ in the aquatic food chain, benthos plays a critical role in the natural flow of energy and nutrients.⁶

H.3.2.1 Methods for Data Collection

Macro-invertebrates will be sampled by adopting the standardized rapid biological assessment sampling techniques (using multi-habitat approach) developed by Barbour et al 1999.⁷ A Surber Sampler or D frame kick net will be used for sampling. Twenty efforts will be taken at each sampling site based on percent availability of each biotope. For example if a sampling site comprises of 80% riffle and 20% pool habitat, then 16 efforts of the Surber Sampler will be conducted in the riffles and 4 efforts in pool (ratio of 80% to 20%).

At each sampling site, the collected material will be rinsed using running clean stream water through the net two to three times. The material will be transferred into a large (white) tray or a bucket. The sample will then be transferred to a container and covered with 10% formalin.

In the laboratory, each sample will be put into a sieve of 500 µm mesh size and rinsed with running water (to remove traces of formalin). Macro-invertebrates will then be

⁶ Williams D. D. and Feltmate, B. W. 1992. Aquatic Insects. CAB International Wallingford, Oxon. 360 pp.

⁷ Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

sorted from the samples and identified using a Kyowa Stereozoom Microscope and the identification keys given in Edmondson, 1959⁸; Ali 1967⁹, Ali 1970¹⁰, Bouchard 2004.¹¹

The abundance of macro-invertebrates per square meter will be calculated and the pollution tolerance of the identified taxa will be taken from HKH bios scoring list (Hindukush Himalayan Score Bio-assessment) (Hartmann *et al.*, Deliverable 10).¹² The Functional Feeding Group of each taxon will be identified.

The survey form for macro-invertebrates is given in **Exhibit H.9**.

⁸ Fresh-Water Biology Fresh-Water Biology, Second Edition. By hb Ward and gc Whipple (wt Edmondson, Editor). John Wiley and Sons, New York. 1959.

⁹ Ali, S.R. 1967. The Mayflies (Order: Ephemeroptera) of Rawalpindi District. Pak. J. Sci. 19 (3): 73-86.

¹⁰ Ali, S.R. 1970. Certain Mayflies of West Pakistan. Pak. J. Sci. 22 (3 & 4): 118-124.

¹¹ Bouchard, R.W. Jr. 2004. Guide to Aquatic Macroinvertebrates of Upper Midwest. Water Resources Center, University of Minnesota, St. Paul, Minnesota. 208pp.

¹² Hartmann, A., O. Moog, T. Ofenböck, T. Korte, S. Sharma and D. Hering. Deliverable No. 10. ASSESS-HKH Methodology Manual describing fundamentals a application of three approaches to evaluate river quality based on benthic macroinvertebrates: HKH screening, HKH score bioassessment & HKH multimetric bioassessment. 80pp. www.assess-hkh.at

Exhibit H.9: Survey Form – Macro-invertebrates

ID		W P		Observer(s)	
Date		Start Time		End Time	
	[dd/mm/yy]		[HH:MM]		[HH:MM]
	Starting Coordinates	End Coordinates	Cloud Cover	%	
Latitude		N	N	Wind	<input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Strong
Longitude		E	E	Precipitation	<input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
[Deg Min Sec]			Temperature		
River Habitats	<input type="checkbox"/> Riffles	<input type="checkbox"/> Pools	<input type="checkbox"/> Glides	<input type="checkbox"/> Rapids	Locality
Riverbed	<input type="checkbox"/> Sand	<input type="checkbox"/> Silt	<input type="checkbox"/> Small Cobbles	<input type="checkbox"/> Large Cobbles	
Depth of Riverbed	<input type="checkbox"/> Boulders _____ <input type="checkbox"/> Others/Special Habitats _____				
(Please select only one box for Habitat)					
Elevation (m)		Temp. (oC)		pH	
				DO	
				Turbidity	
				No. of kick nets	

No.	Taxa/Species	Count	Comments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

H.3.3 Periphyton

The term periphyton refers to the film of living matter coating almost all surfaces in streams. It is usually dominated by benthic algae, but also includes diatoms, bacteria, fungi and other organic matter. Benthic algae are the primary producers in rivers, providing food for macro-invertebrates and fish. They respond rapidly to changing conditions, and they are often the first organisms to respond to and to recover from stress.

Periphyton samples are best collected in dry season when flows are low and turbidity is minimal with high light penetration that supports the growth of biomass. Periphyton is scoured away in turbid flows in the transition season when flows start increasing due to snow melt.

H.3.3.1 Methods for Data Collection

Collection of five stones of similar size from slow-flowing areas of the run will be carried out at each sampling site. All five stones will be collected from locations with similar almost water depths. Only stones with the following measures will be used: the long axis of each selected stone is between 150 mm and 250 mm; depths is between 20 cm and 40 cm.

It will be ensured that:

- ▶ the algal sampling area is kept separate from the macro-invertebrate sampling area as the kick sampling technique used for macro-invertebrate sampling dislodges the periphyton;
- ▶ only those stones are taken which are from the part of the channel that is inundated all year around.

The sampling protocol that will be used for each stone is as follows:

- ▶ Measure water depth *in situ* at each stone location prior to its removal from the river bed.
- ▶ Place a stone in a sampling tray and remove the periphyton by scrubbing and rinsing with clean water (sediment –free) brought to site, and until no change in the rinsing water is evident.
- ▶ Extract a sub-sample of 30 ml from the sample and preserve in 1 ml Lugol's solution for further identification of algal species.
- ▶ The remainder of the sample slurry should be stored on ice in a cooler box in the field, and frozen within 12 hours of collection, for determination of periphyton biomass (ash free dry weight).
- ▶ Measure the dimensions of each stone as the longest axis (i.e. x), the longest horizontal axis perpendicular to x, (i.e. y) and the longest vertical axis of the stone (i.e. z) and note in the format.

The survey form for periphyton sampling is given in **Exhibit H.10**.

Exhibit H.10: Survey Form – Periphyton

ID		W P		Observer(s)	
Date		Start Time		End Time	
	[dd/mm/yy]		[HH:MM]		[HH:MM]
			Cloud Cover		%
Direction	Starting Coordinates		End Coordinates		
Latitude	N		N		
Longitude	E		E		
[Deg Min Sec]			Temperature		
Type of River Habitat	<input type="checkbox"/> Pools		<input type="checkbox"/> Glides		Water Depth
	<input type="checkbox"/> Sand		<input type="checkbox"/> Riffles		
	<input type="checkbox"/> Silt		<input type="checkbox"/> Rapids		
	<input type="checkbox"/> Boulders_____		<input type="checkbox"/> Small Cobbles		
<input type="checkbox"/> Nature of river bed _____		<input type="checkbox"/> Large Cobbles			
		<input type="checkbox"/> Others/Special Habitats			
		Other _____			
(Please select only one box for Habitat)					
Water Attributes			Locality		
Elevation (m)		Temp. (oC)		pH	
				DO	
				Turbidity	
				Others	
<i>Rock</i>	<i>Rock Dimensions (xyz)</i>		<i>Depth (cm) at each stone</i>		
1					
2					
3					
4					
5					

H.3.4 Methods for Sample Analysis

When defrosted, each sample will be mixed for the measurement of two periphyton biomass indicators (normalized to mg /m²) i.e. total dry mass, (ash free dry weight (AFDW)).

The method for determination of AFDW is as follows:

- ▶ Measure total dry weight by filtering the sub-sample portion through Whatmann GFF 4 glass fibre filter papers which are then dried at 60oC overnight. Then ash the samples in an oven at 400oC for 4 hours. The difference between the dry weight and the weight of the ash is the organic component (i.e. AFDM) of the periphyton.
- ▶ AFDW values for each subsample should be adjusted by dividing by 30 and multiplying by the total slurry volume to obtain AFDM values for each stone.

Calculate the surface area of each stone using the following equation:

$$\text{Stone Surface Area} = \frac{0.014(xy+xz+yz) + 33.819}{10,000}$$

where stone surface area is in m² and x, y, z are the measured stone dimensions in mm.

- ▶ Multiply AFDM values for each stone by the surface area of that stone to obtain a density per unit stone surface area.

H.3.5 Riparian Vegetation

Riparian vegetation is the plant community sustained by river flow, groundwater or generally moist conditions along river margins, and is typically distinct in species composition from adjacent terrestrial communities.¹³

Riparian vegetation plays a central role in the functioning of riverine ecosystems: bank erosion is reduced through armoring; water quality is maintained through trapping of sediment, nutrients and other contaminants, and shading regulates river water temperature and thus primary productivity; food is provided for riparian animals in the form of fruits, nuts and leaves, and for aquatic macro-invertebrates in the form of leaf litter; the plants themselves offer a diverse array of habitats as well as a corridor for the movement of migratory terrestrial and semi-aquatic animals.¹⁴

H.3.5.1 Methods for Data Collection

The usual means of sampling vegetation for floristic composition is the quadrat. The vegetation in the marginal zone and flood plain in the Study Area will be sampled by the quadrat method, taking 3 quadrats of 5m x 5m at each sampling site. The first quadrat will be taken at the beginning of the transect, the second at 250 meters and the third at 500 m. All sampling points will include representative habitats, topographic and physiographic conditions of the Terrestrial Study Area. Plants from each quadrat will be noted and collected for the assessment of the plant species if required. Additional plant species in the area adjacent to the quadrat will also be noted down and collected to record the occurrence of the species. Cover, relative cover, density, relative density, frequency, relative frequency percentages and Importance Value Index (IVI) for each species from the study will be calculated by using the following formulae:

The Cover and Relative Cover of species will be calculated using the following formula:

$$\text{Cover} = \frac{\text{Total cover (cm) of a specie}}{\text{Number of plants of a species}}$$

$$\text{Relative Cover} = \frac{\text{Total cover (sq cm) of all plants of a species} \times 100}{\text{Total cover (sq cm) of plants of all species}}$$

The Density and Relative Density of the species in the area will be calculated using the following formulae:

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrats taken}}{\text{Total number of quadrats taken}}$$

¹³ Parkyn, Stephanie. (2004). *Review of Riparian Buffer Zone Effectiveness*. Ministry of Agriculture and Forestry (New Zealand), www.maf.govt.nz/publications.

¹⁴ PROSSER, I.P. 1999. Identifying priorities for riparian restoration aimed at sediment control. Second Australian stream management conference, 8-11 February. Adelaide, South Australia. Pg 511-516.

$$\text{Relative Density} = \frac{\text{Total number of individuals of a species in all quadrats} \times 100}{\text{Total number of individual of all species in all quadrats}}$$

The Frequency and Relative Frequency percentages of the species will be determined using the following formulae:

$$\text{Frequency} = \frac{\text{Number of quadrats of occurrence of a species} \times 100}{\text{Total number of quadrats lay out}}$$

$$\text{Relative Frequency} = \frac{\text{Frequency of a species} \times 100}{\text{Total Frequency of all species}}$$

Importance Value Index (IVI) of all the recorded species will be calculated using the following formulae:

$$\text{IVI} = \frac{\text{Relative cover} + \text{Relative frequency} + \text{Relative density}}{3}$$

Plants collected will be identified following the nomenclature from Flora of Pakistan (Nasir and Ali 1972-1994¹⁵, Ali and Qaiser, 1995-to date¹⁶).

Local people will be consulted to gather information about local names, uses, value and cultural values of the plants of the area.

The locations for sampling of riparian vegetation will be the same as for aquatic ecological resources shown in **Exhibit H.1**.

The riparian vegetation survey form is included in **Exhibit H.11**.

H.3.6 Terrestrial Vegetation

Terrestrial vegetation refers to the plant species that grow on land and are not directly dependent on the river.

H.3.6.1 Methods for Data Collection

The usual means of sampling vegetation for floristic composition is the quadrat. The vegetation in the marginal zone, flood plain and terrestrial habitats in the Study Area was sampled by the quadrat method, taking 3 quadrats of 5m x 5m at each sampling site. The first quadrat was taken at the beginning of the transect, the second at 250 meters and the third at 500 m. All sampling points were sampled to include representative habitats, topographic and physiographic conditions of the Study Area. Plants from each quadrat were noted and collected for the identification of the plant species if required. Additional

¹⁵ S. I. and Nasir. 1972-1994. Flora of Pakistan Fascicles. Islamabad

¹⁶ Ali, S. I. and Qaiser, M. 1995 to date. Flora of Pakistan Fascicles. Karachi

plant species in the area adjacent to the quadrat were also noted down and collected to record the occurrence of the species. Cover, relative cover, density, relative density, frequency, relative frequency percentages and Importance Value Index (IVI) for each species from the study were calculated by using the following formulae:

The Cover and Relative Cover of species and other indices will be calculated using the formulas listed for riparian vegetation.

Exhibit H.11: Survey Form – Riparian Vegetation/Terrestrial Vegetation

ID		W P		Observer(s)	
Date			Start Time		End Time
	[dd/mm/yy]			[HH:MM]	[HH:MM]
	Starting Coordinates			End Coordinates	
Latitude	N			N	
Longitude	E			E	
	[Deg Min Sec]			[Deg Min Sec]	
Habitat	<input type="checkbox"/> Riparian	<input type="checkbox"/> Agricultural Fields	<input type="checkbox"/> Pine Forest	Locality	
	<input type="checkbox"/> Scrub Forest	<input type="checkbox"/> Others/Special Habitats _____			
(Please select only one box for Habitat)					

No.	Species Name	Circumference (Inches)					
		Count	1	2	3	4	5
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							

Note: Quadrates size will be 5 m X 5 m. Three quadrates will be placed. The first will be taken at 0 m, second at 250 m and third at 500 m.

H.3.7 Terrestrial Fauna

Terrestrial fauna refers to the animal species that live predominantly or entirely on land. The focus of monitoring the terrestrial fauna will be on the mammals, small mammals and birds (particularly the vultures) that are likely to be impacted by Project construction and operations.

H.3.7.1 Methods for Data Collection

The methods for data collection for terrestrial mammals has been divided into two categories, small and large mammals. These have been described separately below.

Large Mammals

Line transects (500 m by 20 m) will be placed at each sampling site to record all animals or their signs detected. All the animals sighted, or their signs (foot marks, droppings, dens) will be recorded. GPS coordinates of the location and habitat type will also be documented. Samples of feces and photographs of tracks will be taken and conserved for potential subsequent confirmatory analysis. Transects will be started as early as possible in the day and will cover all possible habitat types in order to avoid bias of stratification.

In addition, incidental sightings of all mammals will be recorded; number of individuals, location and habitat type will be recorded for each sighting. Anecdotal information regarding specific mammals will be collected from the local people and relevant literature will also be consulted.

The survey form for large mammals is given in **Exhibit H.12**.

Exhibit H.12: Survey Form – Large Mammals

ID		W P		Observer(s)	
Date		Start Time		End Time	
	[dd/mm/yy]		[HH:MM]		[HH:MM]
	Starting Coordinates			End Coordinates	
Latitude			N		N
Longitude			E		E
	[Deg Min Sec]			[Deg Min Sec]	
Habitat	<input type="checkbox"/> Riparian <input type="checkbox"/> Agricultural Fields <input type="checkbox"/> Pine Forest <input type="checkbox"/> Scrub Forest <input type="checkbox"/> Others/Special Habitats _____			Locality	
<i>(Please select only one box for Habitat)</i>					

No.	Species Name	Distance* (m)	Sighting	Type of Sign			Comments
				Tracks	Scats	Den	

* Record Mammal 10 m on each side of transect line, 500 m long
 ** Direction of transect towards South

Small Mammals

Live trapping for small mammals will be carried out at various sampling sites. Trapped animals will be identified and released alive after taking measurements.

A mixture of different food grains mixed with fragrant seeds will be used as bait to attract the small mammals. Wheat and rice will be used as food grains while peanut butter, coriander, oats, and onion will be used for fragrance. Freshly prepared bait will be used on every trapping day. Only a small amount of bait will be put on the rear side of the traps. Care will be taken while putting the bait on the rear side of the trap to make sure that it is placed properly on the trap platform.

Sherman traps will be used for the present study to collect live specimens. Thirty to forty traps were set at a specific area in two lines approximately 10 m apart. A colorful ribbon to locate traps the next day will be used to mark each trap. The traps will be set in the evening and checked early the next morning, ensuring that the trapped animals are not killed by heat.

Traps will be checked the following morning as early as possible. The trapped animals will be carefully transferred one after the other into an already weighed transparent polythene bag. Utmost care will be taken to avoid direct handling and harassing the specimens. The species of the trapped animals will be noted. The polythene bag along with the specimen will be weighed and the net weight of the animal will be noted down in a note book. The sex of the specimens will also be observed and documented carefully. The important relevant data, such as the date of trap setting, date of data collection, habitat, location, elevation, and weather conditions, will be recorded on the spot on a data sheet.

The survey form for small mammals is included in **Exhibit H.13**.

Exhibit H.13: Survey Form – Small Mammals

ID		W P		Observer(s)	
Current Date		Time		Traps Set Date	
	[dd/mm/yy]		[HH:MM]		[dd/mm/yy]
Coordinates			Cloud cover	%	Moon Phase
Latitude		N	Wind	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate <input type="checkbox"/> Strong
Longitude		E	Precipitation	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate <input type="checkbox"/> Heavy
[Deg Min Sec]			Temperature		
Grid Size Traps		Distance between traps (m)		Bait	
Habitat	<input type="checkbox"/> Riparian <input type="checkbox"/> Agricultural Fields <input type="checkbox"/> Pine Forest <input type="checkbox"/> Scrub Forest <input type="checkbox"/> Others/Special Habitats _____			Locality	
(Please select only one box for Habitat)					

No.	Species Name	Count	Grid Row	Grid Column	Weight (g)	Sex	Re-capt.	Comments
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								

H.3.8 Herpetofauna

The methods for data collection and analysis for herpetofauna are given in this section.

H.3.8.1 Methods for Data Collection

Line transects 500 m long and 20 m wide will be placed systematically at each sampling site in the Study Area.

An effective way to survey reptiles is by active searching, particularly during the daytime. This method is equally applicable to both nocturnal and diurnal species. The sampling sites will be actively searched for all types of reptiles and amphibians along the line transects. Active searching will also be carried out in sampling areas with a focus on suitable microhabitats. The species collected or observed during the survey will be photographed with a digital camera and necessary field data will be recorded. The coordinates and elevations will be recorded using GPS, and other features of interest like habitat type will be documented.

The presence of signs such as an impression of body, tail or footprints, fecal pellets, tracks, dens or egg laying excavations will also be recorded.

Samples will be collected and preserved for identification purposes where the species cannot be identified in the field for any reason. Hand picking (using bare hands or with the help of long forceps or a snake clutch) is the most efficient way of collecting different species of reptiles. For handling snakes, especially poisonous ones, snake clutches/sticks will be used.

Preservatives such as 10% formalin solution or 50-70% alcohol or methylated spirits solution in water will be added to just cover the specimens, and the container will be covered and left until the specimens are set. In the case of larger specimens, a slit will be made in the belly and preservative will be injected to preserve the internal organs.

The specimens will be stored in the same preservative in a watertight jar. A waterproof label will be added to the jar, giving details of habitat, date and collector's name. A label will be tied to the specimen written with permanent Indian ink or simple carbon pencil.

The specimens will be identified with the help of the most recent keys available in literature (Khan, 2006)¹⁷.

Survey form for herpetofauna is included in **Exhibit H.14**.

¹⁷ Muhammad Sharif Khan. 2006. Amphibians and Reptiles of Pakistan. Krieger Publishing Company, Malabar, Florida, pp. 311.

Exhibit H.14: Survey Form – Herpetofauna

ID		W P		Observer(s)	
Date		Start Time		End Time	
	[dd/mm/yy]		[HH:MM]		[HH:MM]
Direction**	Starting Coordinates	End Coordinates	Cloud Cover	%	
Latitude	N	N	Wind	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate
				<input type="checkbox"/> Strong	
Longitude	E	E	Precipitation	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate
				<input type="checkbox"/> Heavy	
[Deg Min Sec]			Temperature		
Habitat	<input type="checkbox"/> River Bank	<input type="checkbox"/> Agricultural Fields	<input type="checkbox"/> Forest	Locality	
	<input type="checkbox"/> Range Land	<input type="checkbox"/> Others/Special Habitats _____			
(Please select only one box for Habitat)					

No.	Species Name	Distance* (m)	Count	Comments
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

Note: See attached list for names of some of the reptile species found in the study area. Please name properly

* Record reptile on the 10 m on each side of transect line, 500 m long

**Direction of transect towards South

H.3.8.2 Methods for Data Analysis

Density and diversity of herpetofauna at each sampling site will be calculated.

H.3.9 Avifauna

The methods for data collection and analysis are given in this section.

H.3.9.1 Methods for Data Collection

Line transects (500 m by 50 m) will be used. The transects will be placed at each sampling site to record all birds observed. Transects will be started as early as possible in the morning and in late afternoon and will cover all possible habitats. The start time and coordinates of the starting point will be recorded. The bird species will be identified using the most recent keys available in literature.¹⁸ Density and diversity of birds will be calculated.

Survey form for avifauna is included in **Exhibit H.15**.

¹⁸ Grimmett, R., Roberts, T., and Inskipp, T. 2008. *Birds of Pakistan*, Yale University Press.

Exhibit H.15: Survey Form – Birds

ID		W P		Observer(s)	
Date		Start Time		End Time	
	[dd/mm/yy]		[HH:MM]		[HH:MM]
Direction**	Starting Coordinates	End Coordinates	Cloud Cover	%	
Latitude	N	N	Wind	<input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Strong	
Longitude	E	E	Precipitation	<input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy	
[Deg Min Sec]			Temperature		
Habitat	<input type="checkbox"/> Riparian <input type="checkbox"/> Agricultural Fields <input type="checkbox"/> Pine Forest <input type="checkbox"/> Scrub Forest <input type="checkbox"/> Others/Special Habitats_____			Locality	
(Please select only one box for Habitat)					

No.	Species Name	Distance* (m)	Count	Comments
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

Note:

* Record birds 25 m on each side of transect line, 500 m long

**Direction of transect towards South

H.3.9.2 Methods for Data Analysis

The species richness (number of species observed) and abundance (number of individuals of each species observed) at the specified sampling sites will be calculated.

H.4 Equipment Required

The following equipment will be required for the field surveys:

- ▶ 2 GPS
- ▶ 2 Cameras
- ▶ 2 Measuring Tapes
- ▶ 1 Graduated Measuring Rod
- ▶ 10 Sampling Collection Bags
- ▶ 40 Sherman Traps
- ▶ 1 Pair of Binoculars

H.5 Schedule

The Winter Survey was carried out between February 24, 2017 and March 1, 2017. The Spring Survey will be carried out between May 7, 2017 and May 19, 2017.

H.6 Team

The team for the ecology field survey will consist of the following members:

<i>Team Member</i>	<i>Responsibility</i>
Vaqar Zakaria	Quality Control
Dr. M Rafique	Supervisor and Specialist Team Leader: aquatic survey
Ahmad Shoaib	Specialist: aquatic survey; data entry and reporting, field logistics and coordination
Shakeel Ahmad	Aquatic and Mammals survey; data entry
Rafaqat Masroor	Reptile survey; data entry and reporting.
Ghulam Murtaza	Data QA/QC, mammals and bird survey; field logistics; data entry
Mishkatullah	Macro-invertebrate survey; data entry and reporting
Kamran Minai	Quality Control and Reporting

Appendix I: Game Reserves and Breeding of Game Birds

I.1 Pharana Game Reserve

This is located in Pharana with an estimated area of 200 ha. The proposed site is located 15 km west of Mansehra City and easily accessible by road. The climate is warm in summer, mild in winter, with annual rainfall of 72 mm.

Important flora is Phulai, Kahu, Sanatha, Ber, Shisham, Chir, Kamila, Willow Bekar Dhaman, Pataki Thimer Khirk, Granda Kinthi Sharol. The fauna consists of Chakor, Black Partridge, Grey Partridge, Fox, Porcupine, Jackal. Pigeon, Wolf, Wild Boar and Hare.

I.2 Behali Game Reserve

This has a total area of 200 ha. The proposed site is located at a distance of 16 km from Mansehra City and is easily accessible by road. The climate is warm in summer, mild in and winter and the area receives occasional rainfall during the monsoon season; about 72 mm annually.

The flora and fauna is the same as that of Pharana Game Reserve.

I.3 Sheikh Abad Game Reserve

This has a total area of 400 ha. The proposed site is located at a distance of 6 km west of Mansehra City and is easily accessible by road. The climatic conditions are similar that of Pharana and Behali Game Reserves.

Important flora includes Phulai, Kahu, Sanatha, Ber, Chir, Bekar, Kamila, Willow, Dhaman, Granda, Pataki and Thimer. The fauna consists of Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Rock Pigeon, Wolf, Hare, Wild Boar and Quail.

I.4 Bhalli Ghatti Game Reserve

This has a total area of 600 ha. The proposed site is located at a distance of 18 km west of Mansehra City and easily accessible by road. Climatic conditions are similar to Pharana and Behali Game Reserves.

The important fauna is Phulai, Kahu, Sanatha, Ber, Chir, Bekar. Kamila, Willow. Pataki, Thimer and Khirk Granda. The important fauna Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild boar.

I.5 Jallo Game Reserve

This has a total area of 200 ha. The proposed site is located 6 km from Mansehra City and is easily accessible by road. Climatic conditions are similar to Pharana and Behali Game Reserves.

The important flora includes Phulai, Kahu, Sanatha, Ber, Chir, Bekar, Kamila Willow, Pataki, Thimer and Khirk Granda. Important fauna consists of Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild Boar.

I.6 Kareer Game Reserve

This has a total area of 200 ha. The proposed site is located at a distance of 22 km from Mansehra City and easily accessible by road. Climatic conditions are similar to Pharana and Behali Game Reserves.

The flora includes Phulai, Kahu, Sanatha, Ber, Shisham, Chir, Bekar, Kamila, Willow Pataki and Thimer. The fauna is black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild Boar.

I.7 Battal Game Reserve

This has a total area of 32 ha. The proposed site is located at a distance of 20 km north of Mansehra City and is easily accessible by road. Climatic conditions are similar to Pharana and Behali Game Reserves.

The flora includes Phulai, Kahu, Sanatha, Ber, Shisham, Chir, Bekar, Kamila, Willow Pataki and Thimer. The fauna includes Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild boar.

I.8 Palsala Dhanaka Game Reserve

This has a total area of 530 ha. The proposed site is located at a distance of 50 km west of Mansehra City and is easily accessible by road. The temperature in summers rises up to 36°C, while the winters are not very cold. Rainfall is about 72 mm annually.

The flora includes Phulai, Kahu, Sanatha, Ber, Shisham, Chir, Bekar, Kamila, Willow Pataki Thimer and Granda. The fauna includes Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild boar.

I.9 Lassan Thukral Game Reserve

This has a total area of 30.8 ha. The proposed site is located at a distance of 18 km west of Mansehra City and is easily by road. Climatic conditions are similar to Palsala Dhanaka Game Reserve.

The flora includes Phulai, Kahu, Sanatha, Ber, Shisham, Chir, Bekar, Kamila, Willow Pataki Thimer and Granda. The fauna includes Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild boar.

I.10 Khawajgan Community Game Reserve

The total area is 30.8 ha. The proposed site is located at a distance of 24 km north of Mansehra City and is easily accessible by road. The climate is warm in summer, mild in winter, with occasional rainfall in the monsoon season with annual rainfall being 72 mm.

The flora includes Phulai, Kahu, Sanatha, Ber, Shisham, Chir, Bekar, Kamila, Willow Pataki Thimer and Granda. The fauna includes Black Partridge, Grey Partridge, Chakor, Fox, Porcupine, Jackal, Pigeon, Wolf, Hare and Wild boar.

I.11 Partridge Breeding Center at Lasan Nawab Mansehra

This was established in February 2009. It has a total area of 3,716 square meters. The objectives of establishing it are as follows:

- ▶ To provide secure habitat for natural breeding of Black, Brown and Chukar partridges.
- ▶ To provide an opportunity for artificial breeding by collecting eggs and hatching them in incubators.
- ▶ To ensure healthy population of partridges for stocking Game Reserves.

I.11.1 Dhodial Pheasantry

Dhodial Pheasantry was developed in 1984. Dhodial is located 15 km southwest of Balakot. The objectives of this development are as follows:

- ▶ To breed in captivity the Pheasant of KP for re-introduction and stocking.
- ▶ Scientific study and research into Pheasants in captivity.
- ▶ Education and awareness raising amongst the general public.
- ▶ Promotion of Exotic Pheasants amongst aviculturists.
- ▶ Linkages of Pheasant Biodiversity with social mobilization of poor communities.

There are about fifty two species of pheasants worldwide, out of which all but one are found in Asia. In Pakistan there are six types of pheasants including Blue Peacock, Kaleej Pheasant, Koklas Pheasant, Cheer Pheasant, Western Tragopan and Monal Pheasant. The following types of domestic and exotic species of pheasants are found in Dhodial.

1. Ring-Necked Pheasant
2. Wood Green Pheasant
3. White Pheasant
4. Silver Pheasant
5. Golden Pheasant

6. Yellow Golden Pheasant
7. Lady Amherst's Pheasant
8. Cheer Pheasant
9. Reeves Pheasant
10. Nepal Kaleej Pheasant
11. White Crested Kalij Pheasant
12. Temminks Tragopan Pheasant
13. Satyr Tragopan Pheasant
14. Edward Pheasant
15. Brown-eared Pheasant
16. Blue-eared Pheasant
17. White eared Pheasant
18. Grey-peacock Pheasant
19. Humes Bar tailed pheasant
20. Siamees Fire back Pheasant
21. Mikado Pheasant
22. Elliots pheasant
23. Imperial Pheasant
24. Swinhoes Pheasant
25. Monal Pheasant
26. Kokhlas Pheasant
27. Indian Red Jungle Fowl
28. Blue peacock
29. Pied Peacock
30. White Peacock
31. Black Shoulder Peacock

In addition to these pheasants different types of cranes and doves are also present.

By virtue of its area and types of pheasants therein, Dhodial Pheasantry is the largest pheasantry of Asia. It has global fame in connection with breeding of Chir Pheasants; presently there are fifty eight pairs of Chir Pheasants. Each year several Chir Pheasants are released in their natural habitats to assist in rehabilitation of the population.

Appendix J: Ecology Field Data

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Exhibit J.5: Herpetofauna	J-7

Exhibit J.1: Riparian Vegetation

Location ID	Coordinates		Date	Habitat	<i>Conyza canadensis</i>		<i>Dalbergia sissoo</i>		<i>Dodonaea viscosa</i>		<i>Ficus carica</i>		<i>Mentha longifolia</i>		<i>Parthenium hysterophorus</i>		<i>Phragmites karka</i>	
	Latitude (N)	Longitude (E)			Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count
R1	34 39 38.28	73 28 16.44	5/22/17	Riparian	0.15	3	0.00	-	0.00	-	0.08	1	0.00	-	0.04	2	0.00	-
R2	34 37 36.35	73 25 16.35	5/22/17	Riparian	0.04	2	0.00	-	0.00	-	0.00	-	0.00	-	0.33	8	0.00	-
R3	34 35 8.84	73 21 48.23	5/22/17	Riparian	0.05	6	0.62	5	0.00	-	0.00	-	0.00	-	0.17	4	0.00	-
R4	34 29 15.62	73 21 22.55	5/22/17	Riparian	0.16	12	0.15	4	0.07	1	0.10	3	0.06	4	0.08	5	0.19	8
					23		9		1		4		4		19		8	

Location ID	Coordinates		Date	Habitat	<i>Ricinus communis</i>		<i>Rumex dissectus</i>		<i>Solanum surrattense</i>		<i>Sonchus asper</i>		<i>Traxicum sp.</i>		<i>Typha elephantina</i>		Total Cover	Total count	Species Count
	Latitude (N)	Longitude (E)			Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count			
R1	34 39 38.28	73 28 16.44	5/22/17	Riparian	0.00	-	0.22	6	0.03	1	0.00	-	0.02	1	0.00	-	0.54	14	6
R2	34 37 36.35	73 25 16.35	5/22/17	Riparian	0.03	1	0.12	4	0.00	-	0.00	-	0.00	-	0.00	-	0.52	15	4
R3	34 35 8.84	73 21 48.23	5/22/17	Riparian	0.00	-	0.19	4	0.00	-	0.07	3	0.02	1	0.00	-	1.11	23	6
R4	34 29 15.62	73 21 22.55	5/22/17	Riparian	0.00	-	0.00	-	0.00	-	0.02	1	0.00	-	0.66	20	1.48	58	9
					1		14		1		4		2		20	3.7	110	13	

Exhibit J.2: Terrestrial Vegetation

Location ID	Coordinates		Date	Habitat	Acacia modesta		Acer caesium		Ailanthus altissima		Asparagus sp.		Berberis sp.		Cannabis sativa		Carissa opaca		Capsella bursa-pastoris		Cedrus deodara		Coryza canadensis		Dodonaea viscosa		Ficus carica		Fragaria vesca		Indigofera sp.		Juglans regia		Launaea procumbens	
	Latitude (N)	Longitude (E)			Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count
T1	34 39 34.4	73 29 12.7	5/21/17	Pine Forest	0.00	-	0.04	2	0.09	2	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	11.00	4	0.00	-	0.00	-	0.29	4	0.00	-	0.00	-	0.00	-	0.07	4
T2	34 39 29.9	73 27 49	5/21/17	Agricultural Fields	0.00	-	0.00	-	0.00	-	0.00	-	1.37	10	0.00	-	0.00	-	0.00	-	0.00	-	0.06	2	0.00	-	0.00	-	0.28	15	0.45	4	3.69	1	0.02	1
T3	34 39 40.7	73 27 48	5/21/17	Scrub Forest	0.00	-	0.00	-	0.00	-	0.06	1	0.10	2	0.02	5	0.00	-	0.06	2	0.00	-	0.00	-	0.00	-	0.12	3	0.04	10	0.67	4	4.74	1	0.00	-
T4	34 39 49	73 27 30	5/21/17	Scrub Forest	0.74	2	0.00	-	0.86	5	0.00	-	0.25	1	0.02	4	0.00	-	0.00	-	0.00	-	0.05	4	0.13	1	0.00	-	0.00	-	0.00	-	0.00	-	0.01	1
T5	34 39 32.2	73 27 10.6	5/21/17	Scrub Forest	0.00	-	0.00	-	0.10	1	0.00	-	0.65	4	0.21	20	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.10	5	0.39	4	0.00	-	0.00	-		
T6	34 39 0.5	73 26 31.6	5/21/17	Scrub Forest	0.00	-	0.00	-	1.34	4	0.05	1	0.13	1	0.00	-	0.00	-	0.02	1	0.00	-	0.00	-	0.00	-	0.28	2	0.00	-	0.00	-	0.00	-		
T7	34 38 24.2	73 26 19.8	5/21/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.07	3	0.00	-	0.00	-	0.00	-	0.00	-	0.09	1	0.00	-
T8	34 36 4.6	73 22 54.2	5/20/17	Pine Forest	0.00	-	0.00	-	0.28	4	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
T9	34 39 40.7	73 27 48	5/20/17	Scrub Forest	0.00	-	0.00	-	1.16	3	0.00	-	0.51	5	0.00	-	0.00	-	0.00	-	0.00	-	0.04	10	0.00	-	6.75	1	0.00	-	0.40	3	0.00	-	0.00	-
T10	34 35 26.1	73 22 19.1	5/20/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.04	1	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.14	2	0.00	-	0.00	-
T11	34 34 43.5	73 22 12.6	5/19/17	Agricultural Fields	0.00	-	0.00	-	1.02	1	0.00	-	0.35	3	0.08	4	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.66	1	0.00	-	0.21	2	0.92	1	0.07	3
T12	34 35 15.5	73 22 25	5/20/17	Scrub Forest	2.74	5	0.00	-	0.00	-	0.00	-	0.79	2	0.30	25	0.00	-	0.00	-	0.00	-	0.10	2	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
T13	34 34 57.6	73 22 5.9	5/20/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.87	6	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	2.61	4	0.11	5	0.00	-	0.00	-	0.00	-
					7		2		20		2		34		58		0		4		4		21		1		15		35		20		3		9	

Location ID	Coordinates		Date	Habitat	Malva parviflora		Malvastrum coromandelianum		Melia azedarach		Oxalis corniculata		Picea smithiana		Pinus wallichiana		Populus ciliata		Punica granatum		Robinia pseudoacacia		Rumex dantatus		Rumex dissectus		Lamium album.		Solanum nigrum		Sonchus asper		Traxicum sp.		Urtica dioica		Total Cover %	Total count	Species Count
	Latitude (N)	Longitude (E)			Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count	Cover %	Count					
T1	34 36 36.6	73 29 51	5/21/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.86	1	0.52	1	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.32	1	0.00	-	0.00	-	0.38	15	13.57	34	0
T2	34 39 29.9	73 27 49	5/21/17	Agricultural Fields	0.00	-	0.06	10	0.00	-	0.08	12	0.00	-	0.00	-	0.00	-	0.49	1	0.00	-	0.12	2	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	6.63	58	0
T3	34 39 40.7	73 27 48	5/21/17	Scrub Forest	0.00	-	0.00	-	0.00	-	0.03	10	0.00	-	0.00	-	0.00	-	0.00	-	0.06	2	0.00	-	0.00	-	0.06	1	0.00	-	0.09	3	0.00	-	0.00	-	6.05	44	0
T4	34 39 49	73 27 30	5/21/17	Scrub Forest	0.00	-	0.00	-	0.00	-	0.05	12	0.00	-	0.00	-	0.00	-	0.28	3	0.00	-	1.63	14	0.00	-	0.00	-	0.05	1	0.00	-	0.00	-	0.00	-	4.08	48	3
T5	34 39 32.2	73 27 10.6	5/21/17	Scrub Forest	0.00	-	0.00	-	0.57	1	0.00	-	0.00	-	0.00	-	0.69	2	0.00	-	0.29	1	0.00	-	1.13	11	0.12	8	0.00	-	0.00	-	0.00	-	0.00	-	4.25	57	1
T6	34 39 0.5	73 26 31.6	5/21/17	Scrub Forest	0.03	4	0.00	-	0.00	-	0.00	-	0.00	-	2.92	3	0.00	-	0.46	2	0.00	-	0.71	7	0.00	-	0.00	-	0.00	-	0.07	2	0.00	-	0.00	-	6.00	27	2
T7	34 38 24.2	73 26 19.8	5/21/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	16.52	6	0.00	-	0.00	-	0.77	2	0.00	-	1.31	12	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	18.76	24	2
T8	34 36 4.6	73 22 54.2	5/20/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.36	1	0.00	-	0.00	-	0.00	-	0.00	-	0.13	4	0.00	-	0.00	-	0.00	-	0.77	9	0
T9	34 39 40.7	73 27 48	5/20/17	Scrub Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.12	2	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	8.99	24	2
T10	34 35 26.1	73 22 19.1	5/20/17	Pine Forest	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	1.90	5	0.00	-	0.10	2	0.00	-	0.00	-	0.05	1	0.00	-	0.00	-	0.00	-	2.23	11	5
T11	34 34 43.5	73 22 12.6	5/19/17	Agricultural Fields	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.37	2	0.00	-	0.14	3	0.18	4	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	3.99	24	0
T12	34 35 15.5	73 22 25	5/20/17	Scrub Forest	0.00	-	0.00	-	0.71	1	0.04	18	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	4.69	53	0
T13	34 34 57.6	73 22 5.9	5/20/17	Pine Forest	0.00	-	0.00	-	2.38	2	0.00	-	0.00	-	0.00	-	0.00	-	0.43	1	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	6.40	18	0
					4		10		4		52		1		7		5		5		15		7		50		8		2		6		5		15		86.4	431	31

Exhibit J.3: Mammals

Transect ID	Date	Coordinates		Habitat	Locality	<i>Canis aureus</i>			<i>Hystrix indica</i>			<i>Vulpes vulpes</i>			<i>Herpestes javanicus</i>			Sighting		Signs	
		Latitude (N)	Longitude (E)			Asiatic Jackal			Indian Crested Porcupine			Red Fox			Small Asian Mongoose			Total	Species Count	Total	Species Count
						Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total	Sighting	Signs	Total				
T1	05/21/17	34 39 34.4	73 29 12.7	Pine Forest	Paras	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	-
T3	05/21/17	34 39 40.7	73 27 48.0	Agricultural Area	Paras	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1
T4	05/21/17	34 39 49	73 27 30.0	Scrub Forest	Paras	-	-	-	-	-	-	1	-	1	-	-	-	1	1	-	-
T7	05/21/17	34 38 24.2	73 26 19.8	Pine Forest	Paras	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1
T8	05/21/17	34 36 4.6	73 22 54.2	Pine Forest	Sangarr	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1
T10	05/21/17	34 35 26.1	73 22 19.1	Pine Forest	Sangarr	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1
T11	05/21/17	34 34 43.5	73 22 12.6	Agricultural Area	Sangarr	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	1
T13	05/20/17	34 34 57.6	73 22 5.90	Pine Forest	Sangarr	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1
R2	05/22/17	34 37 36.35	73 25 16.35	Riparian	Kiwai	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1
R3	05/22/17	34 35 8.84	73 21 48.23	Riparian	Near Balakot	1	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-
						1	5	6	-	2	2	1	-	1	1	-	1	3	3	7	7

Exhibit J.4: Birds

Location ID	Date	Starting		Habitat	Hypsipetes leucocephalus	Terpsiphone paradisi	Acridotheres ginginianus	Hirundo rustica	Dicurus macrocerus	Phoenicurus ochruros	Milvus migrans	Myophonus caeruleus	Monticola cinclorhynchus	Phylloscopus collybita	Grus grus	Falco tinnunculus	Corvus corax	Oriolus oriolus	Emberiza cia	Pernis apivorus	Parus major	Chloris spinoides	Corvus splendens	Passer domesticus	Oriolus kundoo	Luscinia brunnea	Turdoides striatus	Streptopelia senegalensis	Egretta garzetta
		Latitude	Longitude		Asian Black Bulbul	Asian paradise flycatcher	Bank myna	Barn Swallow	Black drongo	Black redstart	Black/Common kite	Blue whistling thrush	Blue-capped Rock Thrush	Common chiffchaf	Common Crane	Common kestrel	Common raven	Eurasian golden oriole	Eurasian rock bunting	European honey buzzard	Great tit	Himalayan greenfinch	House crow	House sparrow	Indian Golden Oriole	Indian robin	Jungle babbler	Laughing dove	Little egret
T1	5/21/2017	34 36 36.6	73 29 51	Pine Forest	-	-	25	-	-	-	-	-	10	-	-	15	-	-	-	-	-	-	-	-	-	-	10	-	-
T2	5/21/2017	34 39 29.9	73 27 49	Agricultural Fields	-	30	-	-	10	-	-	-	-	-	-	25	-	-	-	20	-	10	-	25	-	-	-	-	-
T3	5/21/2017	34 39 40.7	73 27 48	Scrub Forest	-	-	15	-	-	-	50	-	-	-	-	25	-	-	-	-	-	10	10	-	-	20	-	-	
T4	5/21/2017	34 39 49	73 27 30	Scrub Forest	-	-	10	-	25	-	25	-	-	50	-	50	30	-	-	30	-	40	-	50	-	-	-	-	-
T5	5/21/2017	34 39 32.2	73 27 10.6	Scrub Forest	-	-	1	-	-	-	-	-	-	-	-	15	-	-	-	10	-	-	-	-	-	-	-	-	-
T6	5/21/2017	34 39 0.5	73 26 31.6	Scrub Forest	-	-	-	-	20	-	-	-	-	-	-	25	-	-	-	-	-	20	-	-	-	-	-	-	-
T7	5/21/2017	34 38 24.2	73 26 19.8	Pine Forest	-	-	25	-	-	-	-	-	-	25	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-
T8	5/20/2017	34 36 4.6	73 22 54.2	Pine Forest	-	-	25	10	-	-	-	-	-	-	-	30	-	-	-	25	-	-	-	-	-	-	-	-	-
T9	5/20/2017	34 39 40.7	73 27 48	Scrub Forest	-	-	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T10	5/20/2017	34 35 26.1	73 22 19.1	Pine Forest	-	-	25	-	-	-	-	-	-	-	-	10	-	-	-	25	-	-	-	-	-	-	-	-	-
T11	5/19/2017	34 34 43.5	73 22 12.6	Agricultural Fields	-	-	20	10	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-
T12	5/20/2017	34 35 15.5	73 22 25	Scrub Forest	-	-	10	-	10	-	-	-	-	-	-	30	-	-	-	15	-	-	-	25	-	-	-	-	-
T13	5/20/2017	34 34 57.6	73 22 5.9	Pine Forest	-	-	10	10	25	-	-	-	-	-	-	-	-	15	15	-	10	15	-	-	25	-	10	-	-
R1	5/22/2017	34 39 38.28	73 28 16.44	Riparian	-	-	30	-	-	-	-	55	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-
R2	5/22/2017	34 37 36.35	73 25 16.35	Riparian	25	-	25	-	25	-	-	-	40	-	-	-	-	-	-	10	-	-	-	-	-	10	-	-	-
R3	5/22/2017	34 35 8.84	73 21 48.23	Riparian	30	50	30	-	-	-	-	25	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-
R4	5/21/2017	34 29 15.62	73 21 22.55	Riparian	-	-	10	75	25	-	15	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	50
					55	80	261	105	140	30	90	80	40	85	50	50	325	15	15	30	115	15	80	10	100	25	40	10	50

Location ID	Date	Coordinates		Habitat	Pericrocotus ethologus	Lanius schach	Copsychus saularis	Zosterops palpebrosus	Cinnyris asiaticus	Pycnonotus cafer	Psittacula krameri	Lanius schach	Phoenicurus erythronotus	Prinia burnesii	Passer rutilans	Pericrocotus brevirostris	Saxicola maurus	Spilopelia chinensis	Garrulax striatus	Prinia crinigera	Eumyias thalassinus	Pycnonotus leucogenys	Motacilla alba	Emberiza stewarti	Urocissa flavirostris	Leiopicus mahattensis	Motacilla flava	Total	Species Count	Percentages
		Latitude	Longitude		Long-tailed minivet	Long-tailed Shrike	Oriental magpie robin	Oriental white eye	Purple sunbird	Red vented bulbul	Rose ringed parakeet	Rufous-backed or long tailed shrike	Rufous-backed redstart	Rufous-vented prinia	Russet sparrow	Short-billed Minivet	Siberian stonechat	Spotted Dove	Striated laughing thrush	Striated prinia	Verditer flycatcher	White cheeked bulbul	White wagtail	White-capped Bunting	Yellow billed blue magpie	Yellow crowned woodpecker	Yellow Wagtail			
T1	5/21/2017	34 39 34.4	73 29 12.7	Pine Forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	10	-	-	-	-	-	85	6	3.07
T2	5/21/2017	34 39 29.9	73 27 49	Agricultural Fields	-	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	30	25	-	-	15	-	-	210	11	7.58
T3	5/21/2017	34 39 40.7	73 27 48	Scrub Forest	-	-	-	-	-	-	30	25	-	-	-	-	-	-	30	-	-	-	-	-	-	-	-	215	9	7.76
T4	5/21/2017	34 39 49	73 27 30	Scrub Forest	-	-	-	-	-	20	-	-	-	20	-	-	-	-	-	-	-	30	-	-	30	-	-	410	13	14.80
T5	5/21/2017	34 39 32.2	73 27 10.6	Scrub Forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	31	4	1.12
T6	5/21/2017	34 39 0.5	73 26 31.6	Scrub Forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	5	95	5	3.43
T7	5/21/2017	34 38 24.2	73 26 19.8	Pine Forest	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	105	5	3.79	
T8	5/20/2017	34 36 4.6	73 22 54.2	Pine Forest	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	10	-	-	-	-	-	125	6	4.51
T9	5/20/2017	34 39 40.7	73 27 48	Scrub Forest	-	-	-	-	-	-	-	-	-	-	25	-	15	-	-	-	-	-	-	50	-	-	-	120	4	4.33
T10	5/20/2017	34 35 26.1	73 22 19.1	Pine Forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	70	4	2.53
T11	5/19/2017	34 34 43.5	73 22 12.6	Agricultural Fields	-	-	-	15	-	-	-	-	-	-	-	15	-	-	-	-	-	10	-	-	-	-	-	120	6	4.33
T12	5/20/2017	34 35 15.5	73 22 25	Scrub Forest	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	110	7	
T13	5/20/2017	34 34 57.6	73 22 5.9	Pine Forest	15	-	-	25	-	-	-	-	50	-	-	-	-	15	-	-	-	25	-	-	25	-	290	15	10.47	
R1	5/22/2017	34 39 38.28	73 28 16.44	Riparian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	135	4	4.87
R2	5/22/2017	34 37 36.35	73 25 16.35	Riparian	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	170	8	6.13
R3	5/22/2017	34 35 8.84	73 21 48.23	Riparian	-	-	-	-	-	-	35	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	205	7	7.40
R4	5/21/2017	34 29 15.62	73 21 22.55	Riparian	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	275	7	9.92
					25	10	10	40	10	20	90	25	50	45	25	15	15	15	30	15	30	185	60	60	45	50	5	2,771	48	96.03

Exhibit J.5: Herpetofauna

Location ID	Date	Coordinates		Habitat	Locality	Asian Garden Lizard	Agrore Valley Rock Agama	Central Asia Cobra	Jan's Cliff Racer	Bengal Monitor	Checkered Keelback	Total	Species Count	Percentage
		Latitude	Longitude			Calotes versicolor	Laudakia agorensis	Naja oxiana	Platycephalus rhodorachis	Varanus bengalensis	Xenochrophis piscator			
T1	5/21/2017	34 39 34.4	73 29 12.7	Pine Forest	Paras	–	20	–	–	–	–	20	1	31.75
T2	5/21/2017	34 39 29.9	73 27 49	Scrub Forest	Paras	1	3	–	–	–	–	4	2	6.35
T3	5/21/2017	34 39 40.7	73 27 48	Agricultural Area	Paras	–	3	1	–	–	–	4	2	6.35
T4	5/21/2017	34 39 49	73 27 30	Scrub Forest	Paras	1	15	–	–	–	–	16	2	25.40
T5	5/21/2017	34 39 32.2	73 27 10.6	Scrub Forest	Paras	–	1	–	–	–	–	1	1	1.59
T7	5/21/2017	34 38 24.2	73 26 19.8	Pine Forest	Paras	1	1	–	–	–	–	2	2	3.17
T8	5/20/2017	34 36 4.6	73 22 54.2	Pine Forest	Sangar	1	–	–	1	–	–	2	2	3.17
T9	5/20/2017	34 39 40.7	73 27 48	Scrub Forest	Sangar	–	1	–	–	–	–	1	1	1.59
T10	5/20/2017	34 35 26.1	73 22 19.1	Pine Forest	Sangar	–	–	–	–	1	–	1	1	1.59
T11	5/19/2017	34 34 43.5	73 22 12.6	Agricultural Area	Sangar	–	1	1	–	1	–	3	3	4.76
T12	5/20/2017	34 35 15.5	73 22 25	Scrub Forest	Scrub Forest	1	–	–	–	–	–	1	1	1.59
T13	5/20/2017	34 34 57.6	73 22 5.9	Pine Forest	Sangar	–	1	–	–	–	–	1	1	1.59
R1	5/22/2017	34 39 38.28	73 28 16.44	Riparian	Paras	1	–	–	–	–	–	1	1	1.59
R2	5/22/2017	34 37 36.35	73 25 16.35	Riparian	Kiwai	–	2	–	–	–	–	2	1	3.17
R3	5/22/2017	34 35 8.84	73 21 48.23	Riparian	Near Balakot	–	–	–	–	–	1	1	1	1.59
R4	5/21/2017	34 29 15.62	73 21 22.55	Riparian	Below Balar Tarrana	–	3	–	–	–	–	3	1	4.76
						6	51	2	1	2	1	63	6	100.00

Appendix K: Species List

K.1 Vegetation

No.	Species Observed	IUCN Status	Invasive	Endemic	CITES Appendices
1.	<i>Acacia modesta</i>	Not Assessed			
2.	<i>Acer caesium</i>	Not Assessed			
3.	<i>Ailanthus altissima</i>	Not Assessed	✓		
4.	<i>Asparagus sp.</i>	Data Deficient			
5.	<i>Berberis sp.</i>	Not Assessed			
6.	<i>Cannabis sativa</i>	Not Assessed	✓		
7.	<i>Carissa opaca</i>	Not Assessed			
8.	<i>Capsella bursa-pastoris</i>	Not Assessed			
9.	<i>Cedrus deodara</i>	Least Concern			
10.	<i>Conyza canadensis</i>	Not Assessed			
11.	<i>Dodonaea viscosa</i>	Not Assessed			
12.	<i>Ficus carica</i>	Least Concern			
13.	<i>Fragaria vesca</i>	Not Assessed			
14.	<i>Indigofera sp.</i>	Not Assessed			
15.	<i>Juglans regia</i>	Near Threatened			
16.	<i>Launaea procumbens</i>	Not Assessed			
17.	<i>Malva parviflora</i>	Not Assessed	✓		
18.	<i>Malvastrum coromandelianum</i>	Not Assessed			
19.	<i>Melia azedarach</i>	Not Assessed			
20.	<i>Oxalis corniculata</i>	Not Assessed			
21.	<i>Picea smithiana</i>	Least Concern			
22.	<i>Pinus wallichiana</i>	Least Concern			
23.	<i>Populus ciliata</i>	Not Assessed			
24.	<i>Punica granatum</i>	Least Concern			
25.	<i>Robinia pseudoacacia</i>	Least Concern	✓		
26.	<i>Rumex dantatus</i>	Not Assessed			
27.	<i>Rumex dissectus</i>	Not Assessed			
28.	<i>Lamium album</i>	Not Assessed			
29.	<i>Solanum nigrum</i>	Not Assessed			

No.	Species Observed	IUCN Status	Invasive	Endemic	CITES Appendices
30.	<i>Sonchus asper</i>	Not Assessed			
31.	<i>Traxicum sp.</i>	Not Assessed			
32.	<i>Urtica dioica</i>	Least Concern			

K.2 Large Mammals

No.	Scientific Name	Common Name	IUCN Status	Endemic	Migratory/ Congregatory Behaviour	CITES Appendices
1.	<i>Panthera pardus</i>	Common leopard	Vulnerable			I
2.	<i>Canis lupus</i>	Gray wolf	Least Concern			I,II
3.	<i>Canis aureus</i>	Asiatic jackal	Least Concern			III
4.	<i>Vulpes vulpes</i>	Red fox	Least Concern			III
5.	<i>Sus scrofa</i>	Wild boar	Least Concern			
6.	<i>Muntiacus muntjak</i>	Barking deer	Least Concern			
7.	<i>Hystrix Indica</i>	Indian crested porcupine	Least Concern			
8.	<i>Lepus capensis</i>	Cape hare	Least Concern			
9.	<i>Macaca mulatta</i>	Rhesus monkey	Least Concern			II
10.	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	Least Concern			III
11.	<i>Herpestes javanicus</i>	Small Asian mongoose	Least Concern			III
12.	<i>Herpestes edwardsii</i>	Indian grey mongoose	Least Concern			III
13.	<i>Eoglaucomys fimbriatus</i>	Small Kashmir flying squirrel	Least Concern			
14.	<i>Felis chaus</i>	Jungle cat	Least Concern			II

K.3 Small Mammals

No.	Scientific Name	Species	IUCN Status	Endemic	Migratory/ Congregatory	CITES Appendices
1.	<i>Hyperacrius fertilis</i>	True Vole	Near Threatened			
2.	<i>Hyperacrius wynnei</i>	Murree Vole	Least Concern			

No.	Scientific Name	Species	IUCN Status	Endemic	Migratory/ Congregatory	CITES Appendices
3.	<i>Apodemus rusiges</i>	Kashmir Field Mouse	Least Concern			
4.	<i>Mus musculus</i>	Field Mouse	Least Concern			
5.	<i>Suncus murinus</i>	Musk Shrew	Least Concern			

K.4 Birds

No	Scientific Name	Common Name	IUCN status	Endemic	Migratory	Congregatory	CITES Appendices
1.	<i>Lanius vittatus</i>	Bay backed shrike	Least Concern				
2.	<i>Accipiter badius</i>	Shikra or Indian sparrow hawk	Least Concern				
3.	<i>Accipiter nisus</i>	Eurasian sparrow hawk	Least Concern				
4.	<i>Acridotheres ginginianus</i>	Bank Myna	Least Concern				
5.	<i>Acridotheres tristis</i>	Indian myna	Least Concern				
6.	<i>Acrocephalus concinens</i>	Blunt winged warbler	Least Concern				
7.	<i>Aegithalos niveogularis</i>	White throated tit	Least Concern				
8.	<i>Aethopyga siparaja</i>	Crimson sunbird	Least Concern				
9.	<i>Anthus rufulus</i>	Paddy field pipit	Least Concern				
10.	<i>Anthus trivialis</i>	Tree pipit	Least Concern				
11.	<i>Apus affinis</i>	House swift	Least Concern				
12.	<i>Aquila rapax</i>	Tawny eagle	Least Concern				
13.	<i>Athene brama</i>	Spotted owlet	Least Concern				
14.	<i>Cercomela fusca</i>	Brown rock chat	Least Concern				
15.	<i>Chaimarrornis fuliginosus</i>	White capped water redstart	Not Assessed		Full Migrant		
16.	<i>Chloris spinoides</i>	Himalayan greenfinch	Least Concern				
17.	<i>Cinnyris asiaticus</i>	Purple sunbird	Least Concern				
18.	<i>Clamator jacobinus</i>	Pied cuckoo	Least Concern		Full Migrant		
19.	<i>Columba livia</i>	Rock pigeon	Least Concern				
20.	<i>Copsychus saularis</i>	Oriental magpie robin	Least Concern				
21.	<i>Coracias benghalensis</i>	Indian roller	Least Concern				

No	Scientific Name	Common Name	IUCN status	Endemic	Migratory	Congregatory	CITES Appendices
22.	<i>Corvus corax</i>	Common raven	Least Concern		Full Migrant		
23.	<i>Corvus macrorhynchos</i>	Large billed crow	Least Concern				
24.	<i>Corvus splendens</i>	House crow	Least Concern				
25.	<i>Dendrocitta vagabunda</i>	Tree pie	Least Concern				
26.	<i>Dendrocopos auriceps</i>	Brown fronted woodpecker	Least Concern				
27.	<i>Dicrurus macrocercus</i>	Black drongo	Least Concern				
28.	<i>Egretta garzetta</i>	Little egret	Least Concern				
29.	<i>Emberiza cia</i>	Eurasian rock bunting	Least Concern				
30.	<i>Emberiza stewarti</i>	Yellow crowned woodpecker	Least Concern		Full Migrant		
31.	<i>Eudynamis scolopaceus</i>	Asian Koel	Least Concern				
32.	<i>Eumyias thalassinus</i>	Verditer Flycatcher	Least Concern				
33.	<i>Falco tinnunculus</i>	Common Kestrel	Least Concern				
34.	<i>Galerida cristata</i>	Crested lark	Least Concern		Full Migrant		
35.	<i>Garrulax striatus</i>	Striated laughing thrush	Least Concern		Full Migrant		
36.	<i>Garrulus lanceolatus</i>	Black headed jay	Least Concern				
37.	<i>Glaucidium cuculoides</i>	Asian barred owlet	Least Concern				
38.	<i>Grus grus</i>	Common Crane	Least Concern		Full Migrant	Congregatory (and dispersive)	II
39.	<i>Gyps bengalensis</i>	White rumped vulture	Critically Endangered		Full Migrant		
40.	<i>Gyps himalayensis</i>	Himalayan griffon vulture	Near Threatened				
41.	<i>Halcyon smyrnensis</i>	White throated kingfisher	Least Concern				
42.	<i>Hirundo rustica</i>	Barn Swallow	Least Concern		Full Migrant	Congregatory (and dispersive)	
43.	<i>Hypsipetes leucocephalus</i>	Asian Black Bulbul	Least Concern				
44.	<i>Lanius schach</i>	Rufous-backed or long tailed shrike	Least Concern				

No	Scientific Name	Common Name	IUCN status	Endemic	Migratory	Congregatory	CITES Appendices
45.	<i>Lonchura punctulata</i>	Scaly-breasted munia	Least Concern				
46.	<i>Lophura leucomelanos</i>	Kalij pheasant	Least Concern				
47.	<i>Luscinia brunnea</i>	Indian robin	Least Concern				
48.	<i>Melanoperdix niger</i>	Black partridge	Vulnerable				
49.	<i>Melophus lathami</i>	Crested bunting	Least Concern				
50.	<i>Merops orientalis</i>	Green bee eater	Least Concern				
51.	<i>Milvus migrans</i>	Black kite	Least Concern				
52.	<i>Mirafra erythroptera</i>	Indian bush lark	Least Concern				III
53.	<i>Monticola cinclorhyncha</i>	Blue-capped Rock Thrush					III
54.	<i>Motacilla alba</i>	White wagtail	Least Concern				
55.	<i>Motacilla flava</i>	Yellow Wagtail					
56.	<i>Motacilla madaraspatensis</i>	White browed wagtail	Not Assessed				
57.	<i>Myophonus caeruleus</i>	Blue whistling thrush	Least Concern		Full Migrant		
58.	<i>Neophron percnopterus</i>	Egyptian vulture	Endangered				
59.	<i>Oriolus kundoo</i>	Indian Golden Oriole					
60.	<i>Oriolus oriolus</i>	Eurasian golden oriole					
61.	<i>Parus major</i>	Great tit	Least Concern		Full Migrant		
62.	<i>Passer domesticus</i>	House sparrow	Least Concern				
63.	<i>Passer rutilans</i>	Russet sparrow				Congregatory (and dispersive)	II
64.	<i>Pavo cristatus</i>	Peafowl	Least Concern		Full Migrant	Congregatory (and dispersive)	II
65.	<i>Perdix perdix</i>	Grey Partridge	Least Concern		Full Migrant	Congregatory (and dispersive)	II
66.	<i>Pericrocotus brevirostris</i>	Short-billed Minivet	Least Concern				II
67.	<i>Pericrocotus ethologus</i>	Long-tailed minivet	Least Concern		Full Migrant	Congregatory (and dispersive)	II
68.	<i>Pernis apivorus</i>	European honey buzzard	Least Concern		Full Migrant	Congregatory (and dispersive)	II

No	Scientific Name	Common Name	IUCN status	Endemic	Migratory	Congregatory	CITES Appendices
69.	<i>Phoenicurus caeruleocephala</i>	Blue caped redstart	Not Assessed		Full Migrant	Congregatory (and dispersive)	II
70.	<i>Phoenicurus ochruros</i>	Black redstart	Least Concern		Full Migrant	Congregatory (and dispersive)	II
71.	<i>Phylloscopus collybita</i>	Common chiffchaf	Least Concern		Full Migrant		
72.	<i>Picus squamatus</i>	Scaly billed woodpecker	Least Concern				
73.	<i>Prinia buchanani</i>	Rufous- fronted prinia	Least Concern				
74.	<i>Prinia burnesii</i>	Rufous-vented prinia	Near Threatened				
75.	<i>Prinia crinigera</i>	Striated prinia	Least Concern				
76.	<i>Prinia gracilis</i>	Graceful prinia	Least Concern				
77.	<i>Prinia hodgsonii</i>	Grey breasted prinia	Least Concern				II
78.	<i>Psittacula krameri</i>	Rose ringed parakeet	Least Concern				II
79.	<i>Pycnonotus cafer</i>	Red vented bulbul	Least Concern		Full Migrant	Congregatory (and dispersive)	
80.	<i>Pycnonotus leucogenys</i>	White cheeked bulbul	Least Concern				
81.	<i>Saxicola caprata</i>	Pied bush chat	Least Concern				
82.	<i>Saxicola ferrea</i>	Grey bush chat	Least Concern				
83.	<i>Saxicola leucurus</i>	White-tailed Stonechat	Least Concern				
84.	<i>Saxicola maurus</i>	Siberian stonechat					
85.	<i>Saxicola torquata</i>	Common bush chat	Least Concern				
86.	<i>Spilopelia chinensis</i>	Spotted Dove					
87.	<i>Streptopelia orientalis</i>	Oriental turtle dove	Least Concern				
88.	<i>Streptopelia senegalensis</i>	Laughing dove	Least Concern				
89.	<i>Sturnia pagodarum</i>	Brahminy Starling	Least Concern				
90.	<i>Sylvia curruca</i>	Lesser whitethroat	Least Concern				
91.	<i>Terpsiphone paradisi</i>	Asian paradise flycatcher	Least Concern				
92.	<i>Turdoides caudatus</i>	Common babbler	Least Concern				

No	Scientific Name	Common Name	IUCN status	Endemic	Migratory	Congregatory	CITES Appendices
93.	<i>Turdoides striatus</i>	Jungle babbler	Not Assessed				
94.	<i>Upupa epops</i>	Common hoopoe	Least Concern				
95.	<i>Urocissa flavirostris</i>	Yellow billed blue magpie	Least Concern				
96.	<i>Zosterops palpebrosus</i>	Oriental white eye	Least Concern				

K.5 Herpetofauna

No	Scientific Name	Common English Name	IUCN status	Endemic	CITES Appendices
1.	<i>Duttaphrynus melanostictus</i>	Common Asian Toad	Least Concern		
2.	<i>Duttaphrynus stomaticus</i>	Marbled Toad or Indus Valley Toad	Least Concern		
3.	<i>Euphlyctis cyanophlyctis</i>	Common Skittering Frog	Least Concern		
4.	<i>Fejervarya limnocharis</i>	Indian Paddy Frog	Least Concern		
5.	<i>Sphaerotheca breviceps</i>	Indian Burrowing Frog	Least Concern		
6.	<i>Microhyla ornata</i>	Ornate Narrow-mouthed frog	Least Concern		
7.	<i>Uperodon systoma</i>	Marbled Baloon Frog	Least Concern		
8.	<i>Calotes versicolor</i>	Asian Garden Lizard	Not Assessed		
9.	<i>Laudakia tuberculata</i>	Kashmir Rock Agama	Not Assessed		
10.	<i>Laudakia agorensis</i>	Agrore Valley Rock Agama	Not Assessed		
11.	<i>Cyrtopodion rohtasfortai</i>	Rohtas Fort Thin-toed Gecko	Not Assessed	✓	
12.	<i>Hemidactylus flaviviridis</i>	Yellow-bellied House Gecko	Not Assessed		
13.	<i>Hemidactylus brookii</i>	Spotted House Gecko	Not Assessed		
14.	<i>Ophisops jerdonii</i>	Punjab Snake-eyed Lacerta	Least Concern		
15.	<i>Ablepharus pannonicus</i>	Asian Snake-eyed Skink	Not Assessed		
16.	<i>Eutropis dissimilis</i>	Striped Grass Skink	Not Assessed		
17.	<i>Varanus bengalensis</i>	Bengal Monitor	Least Concern		I
18.	<i>Amphiesma stolatum</i>	Buff-striped Keelback	Not Assessed		
19.	<i>Lycodon aulicus</i>	Common Wolfsnake	Not Assessed		

No	Scientific Name	Common English Name	IUCN status	Endemic	CITES Appendices
20.	<i>Oligodon arnensis</i>	Russet Kukri Snake	Not Assessed		
21.	<i>Platyceps rhodorachis</i>	Jan's Cliff Racer	Not Assessed		
22.	<i>Ptyas mucosus</i>	Dhaman or Rat Snake	Not Assessed		II
23.	<i>Sibynophis sagittarius</i>	Cantor's Black-headed Snake	Not Assessed		
24.	<i>Spalerosophis atriceps</i>	Black-headed Royal Snake	Not Assessed		
25.	<i>Xenochrophis piscator</i>	Checked Keelback	Not Assessed		III
26.	<i>Bungarus caeruleus</i>	Indian Krait	Not Assessed		
27.	<i>Naja oxiana</i>	Central Asia Cobra	Data Deficient		II
28.	<i>Typhlops madgemintonai</i>	Kashmir Slender Blindsnake	Not Assessed	✓	
29.	<i>Typhlops ahsanuli</i>	Ahsanul;s Wormsnake	Not Assessed		
30.	<i>Typhlops diardi platyventris</i>	Kashmir Blindsnake	Not Assessed		
31.	<i>Daboia russelii</i>	Russell's Chain Viper	Least Concern		III
32.	<i>Echis carinatus sochureki</i>	Sochurek's Saw-scaled Viper	Not Assessed		

Appendix L: Socioeconomic Survey Plan

Pakhtunkhwa Energy Development Organization (PEDO) has planned to construct Balakot Hydropower Development Project (HDIP) or Balakot Hydropower Project (BHPP) to be located on the left bank of Kunhar River in the 12 Km intermediate part from Paras to Sangarh village. The dam site on Kunhar River is about 17 Km upstream of Balakot town. The powerhouse is to be located on the left bank of Kunhar River 10 Km upstream of Balakot, near Kapi Gali village. The whole project layout including headrace tunnel is proposed on the left bank Kunhar River. The maximum and minimum reservoir operating levels will be 1288 and 1283 masl respectively. The installed plant capacity will be 300 MW with mean annual energy output (average 55 years) of 1,143 GWH.

In 2013 a joint venture of Mirza Associates Engineering Services, ILF Beratende Ingenieure ZT GmbH, Innsbruck, Austria and Berkeley Associates prepared the feasibility study of the project. The Environmental and social Impact Assessment of the Balakot HPP is a part of the feasibility report. Asian Development Bank is financing BHPP under PPTA 9185 PAK: Hydropower Development Investment Program and has contracted Hagler Bailly Pakistan (Pvt) Ltd (HBP) to carry out the Environmental Impact Assessment (EIA) including Land Acquisition, required under Asian Development Bank's (ADB) Safeguard Policy Statement (2009, SPS).

This document details the socioeconomic survey plan to enable impact assessment.

L.1 Objective

The main impact pathways on communities are through:

- ▶ Impact on river dependent communities to alteration in flows and due to barrier effect of dam
- ▶ Impact on communities through fugitive dust emissions, blasting, noise, increase in traffic during construction of facilities
- ▶ Impact on communities due to land acquisition and resettlement

The objective of the socioeconomic baseline surveys are to profile the communities, at the settlement level, such that impact assessment may be carried out for the Project. The socioeconomic baseline surveys at settlement level will also provide the initial profile for communities that will likely be resettled as part of the Project. Separate household surveys as part of the Land Acquisition and Resettlement Plan (LARP) will be carried out, and designed on the basis of the information from the settlement level survey, and will address the impact on communities due to land acquisition and resettlement.

L.2 Study Area

The Study Area is delineated using the following buffers and extents:

- ▶ **500 m buffer on each side of river:** along reaches that may be impacted due to the Project, and the zone where there is river dependence (either through use of drift wood, use of sand and gravel as building materials) is a zone of 500 m of the river.
 - ▷ All settlements with a center within the 500 m buffer is included.
 - ▷ All settlements with more than 50% of their land area within the 500 m buffer are also included.
- ▶ **1 km buffer around Project facilities:** for coverage of communities that will be directly impacted through either resettlement, or construction related impacts.
- ▶ **Upstream Extent:** selected as tailrace tunnel of Suki Kinari HPP, upstream of the dam, as the dam as barrier may affect communities reliant on ecological resources (such as fish).
- ▶ **Downstream Extent:** The downstream extend of the Study Area is at the start of Patrind HPP Reservoir.

Keeping in view expected variation between rural and urban areas, impact due to the Project, flow variations along different reaches of the Kunhar River due to tributaries, as well as changes due to other hydropower projects, the Study Area is broken down into different zones along the Kunhar River:

- ▶ **Zone 1:** Upstream of Balakot Dam (including Balakot Reservoir Area)
- ▶ **Zone 2:** Downstream of Balakot Dam up to Upstream of Balakot Tailrace Outlet
- ▶ **Zone 3:** Downstream of Balakot Tailrace Outlet up to Upstream of Balakot City
- ▶ **Zone 4:** Balakot City along Kunhar River
- ▶ **Zone 5:** Downstream of Balakot City up to Patrind Hydropower Reservoir
- ▶ **Zone 6:** 1 km buffer around Project facilities

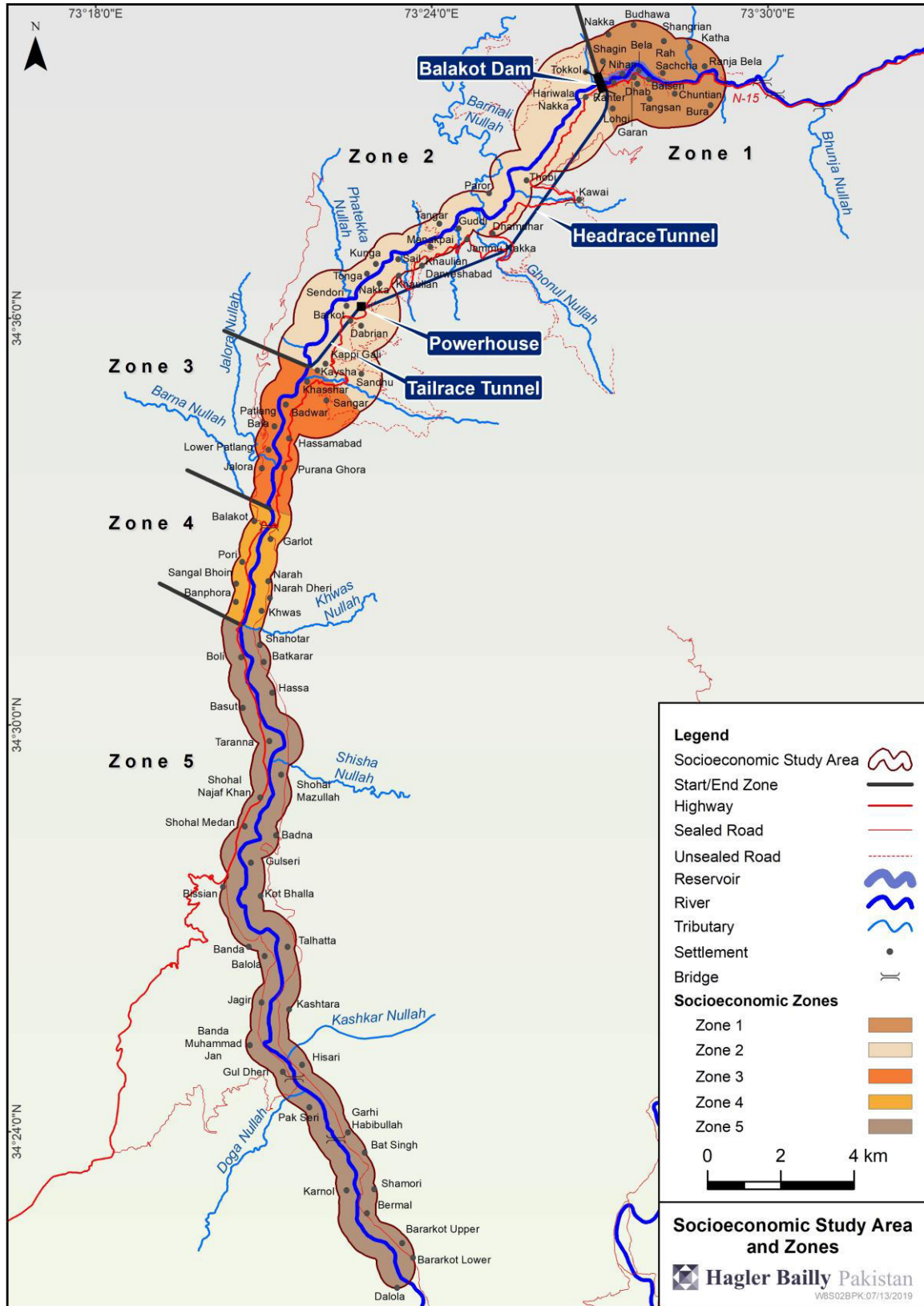
Key information about each zone is provided in **Exhibit L.1**.

Exhibit L.1: Preliminary Information on Zones

Key Information	Zones					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
<i>Number of communities</i>	10	12	10	6	30	12
<i>Type (Rural/Semi-Urban/Urban)</i>	Rural	Rural	Rural	Semi-Urban	Rural and Semi-Urban	Rural
<i>Estimated population</i>	Not available	Not available	Not available	~25,000	Not available	Not available
<i>Potential Impacts</i>	<ul style="list-style-type: none"> ▶ Loss of land, ▶ loss of residence, ▶ loss of income 	<ul style="list-style-type: none"> ▶ Reduction in availability of fish, ▶ reduction in availability of sand and gravel 	<ul style="list-style-type: none"> ▶ Reduction in availability of fish, ▶ reduction in availability of sand and gravel 	<ul style="list-style-type: none"> ▶ Reduction in availability of fish, ▶ reduction in availability of sand and gravel 	<ul style="list-style-type: none"> ▶ Reduction in availability of fish, ▶ reduction in availability of sand and gravel 	<ul style="list-style-type: none"> ▶ Pressure on local infrastructure and cultural issues due to in-migration, ▶ increased opportunities for labour
<i>Potential groups to be affected based on preliminary information</i>	<ul style="list-style-type: none"> ▶ Residents, ▶ agricultural community, ▶ shopkeepers 	People involved in fishing and sand mining	People involved in fishing and sand mining	People involved in fishing and sand mining	People involved in fishing and sand mining	Local communities

Note: Zone 6 will overlap with Zones 1, 2 and 3.

Exhibit L.2: Socioeconomic Study Area and Zones



L.3 Data Sources

Data will be collected through a combination of primary and secondary sources. Key secondary sources of information for the baseline study includes feasibility study of BHPP maps, census reports and previous ESIA studies conducted by HBP and others in the area.

L.4 Methods of Data Collection

Primary data will be collected at settlement level by administering settlement level questionnaires and specific questionnaires for other aspects of interest.

L.5 Socioeconomic Aspects of Interest

Socioeconomic aspects of interest include the following:

- ▶ **Demography:** a description of the sample population and its characteristics, such as dependency ratio, population pyramid and sex ratio.
- ▶ **Infrastructure:** information on existing social and physical infrastructure, such as roads, police facilities, electricity availability, water and sanitation and postal services.
- ▶ **Health:** information on key health issues prevailing in the area and access to health facilities.
- ▶ **Education:** information on educational institutions and their accessibility.
- ▶ **Livelihood:** information on key occupations and income sources.
- ▶ **Income and poverty:** discussion on incomes, use of natural resources, expenditures and debts.
- ▶ **Dependence on ecosystems services:** such as dependence on ecological/natural resources, including the river, of the area as source of livelihood, enjoyment or to meet day to day requirements.
- ▶ **Gender:** All the socioeconomic information will be gathered disaggregated by gender and vulnerability.

L.6 Surveys

The settlement level survey will be completed by social supervisors appointed by HBP, in view of the complex and qualitative nature of information to be obtained in a semi-literate environment. Information will be obtained in discussion with a group of 4 to 5 key informants including, but not limited to, the following:

- ▶ Union Council (local government) heads
- ▶ Educated persons (with Higher School Certificate as minimum level of education attained)

- ▶ School teachers
- ▶ Local government representatives and leaders
- ▶ Community based organization active in the area

The survey forms provided in **Section L.9** and the levels at which the survey will be conducted as follows:

- ▶ **Rural settlement survey:** will be undertaken in selected settlements within each socioeconomic zone, excluding the Balakot zone. A pilot survey will be carried out prior to start of the rural settlement survey. Based on the pilot survey results, settlements for rural settlement surveys will be selected based on their use of the river (fishing, sand mining, domestic uses, and irrigation) and potential impacts of the Project. Detailed interviews will be conducted with key informants (male and female) to gather information on selected settlement's social and economic setup including gender issues, with focus on infrastructure and livelihoods;
- ▶ **Business owner survey:** will be implemented to obtain information on the costs and benefits of the river-dependent businesses, such as, sand mining;
- ▶ **Urban focus group discussions:** will be implemented in Balakot city. Information on the livelihoods, incomes, household demographics and household recreational activities will be obtained through discussions with municipal, and other city departments, for information on various river-dependent activities.

Exhibit L.3: Socioeconomic Surveys

<i>Survey Type</i>	<i>Purpose</i>	<i>Coverage and Sampling</i>	<i>Expected Duration</i>	<i>Team Composition</i>
Pilot	Testing forms for relevance and accuracy Identification of settlements Ensuring inclusion of settlements	Selected urban and rural households; selected businesses; one rural settlement	2 days	▶ To be determined
Revision in plan based on pilot	Updating survey plan		1 day	▶ Project Manager
Rural settlement	Settlement's social and economic setup, with focus on infrastructure and livelihoods	Selected settlements within zone (marked in Exhibit E.2).	Expected 9 to 11 days, assuming two to three settlements are covered per day	▶ Socioeconomic specialist ▶ 1 male and 1 female enumerator ▶ 1 male and 1 female consultation specialist
River-dependent business	To obtain information on costs and benefits of the river-dependent businesses	Minimum two business owners each from small, medium and large-scale businesses. The number could increase if variation is observed.	To be covered alongside the rural settlement survey	▶ Socioeconomic specialist ▶ Local environmental scientist
City departments and urban planning, and focus group	To obtain information municipal services, tourism, fisheries and agriculture. To obtain information on livelihoods, incomes, demographics and recreational activities.	Mainly fisheries and municipal departments and if required, other departments.	2 days	▶ Socioeconomic specialist ▶ Local environmental scientist

L.7 Sampling Technique

The pilot survey prior the main socioeconomic survey will help determine the river dependent communities along the river within each zone. Based on current knowledge (and lack), there could be up to 48 communities within the Study Area. Based on the scoping survey at least 30% of communities dependent on river within each rural zone will be covered through settlement level surveys with a minimum number of 10 villages, in addition to separate key informant questionnaires that will be utilized across the Study Area, and not limited to selected settlements. This will be revisited based on the analysis and adjustments to will be made accordingly.

Community consultations will be carried out concurrent with the socioeconomic surveys.

L.8 Survey Team

One survey team will be deployed with each survey team comprised of:

- ▶ Male social investigator
- ▶ Female social investigator
- ▶ Consultation specialist
- ▶ GIS specialist (as needed)

Social investigators will be familiar with the local culture and languages with tertiary education in social sciences or related fields.

L.9 Survey Forms

See following pages.

Questionnaire Number

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BASELINE SOCIOECONOMIC CONDITIONS

Questionnaire for Household Profile

A. Investigator Information

Name of Investigator(s): _____

Date: _____ Start Time: _____ End Time: _____

Note any pause in interview shall be noted in the Comments section on Page 10

B. Location Information

Primary Structure ID: _____ Settlement: _____ Mauza: _____

Other Structures (with explanation): _____

UC: _____ Tehsil: _____ District: _____

GPS Coordinate: _____° _____' _____" N, _____° _____' _____" E

1. Structure ID should be the same as that on the area map. If the family has more than one structures, list the remaining IDs in the second row with explanation in brackets.
2. GPS coordinate to be provided only where GPS is available
3. Settlement is the name by which the village is identified by the residents
4. Mauza is the revenue village

C. Respondent and Head of Household (HHH) Information

	<i>Respondent</i>	<i>Head of Household</i>
Name		
Father/Husband Name		
NIC Number		
Mobile Number		
Gender	<input type="checkbox"/> Male <input type="checkbox"/> Female	<input type="checkbox"/> Male <input type="checkbox"/> Female
Age (Response)		
Year of Birth (as in NIC)		
Relation to HHH	<input type="checkbox"/> Self <input type="checkbox"/> Father <input type="checkbox"/> Brother <input type="checkbox"/> Son <input type="checkbox"/> Other _____	
Education	<input type="checkbox"/> Illiterate <input type="checkbox"/> Madrassah <input type="checkbox"/> No or less than Primary <input type="checkbox"/> Primary (Class 5 to Class 9) <input type="checkbox"/> Matric (Class 10) <input type="checkbox"/> Intermediate (FA/FSc) <input type="checkbox"/> Graduate (BA/BSc) <input type="checkbox"/> Other _____	<input type="checkbox"/> Illiterate <input type="checkbox"/> Madrassah <input type="checkbox"/> No or less than Primary <input type="checkbox"/> Primary (Class 5 to Class 9) <input type="checkbox"/> Matric (Class 10) <input type="checkbox"/> Intermediate (FA/FSc) <input type="checkbox"/> Graduate (BA/BSc) <input type="checkbox"/> Other _____

If respondent is the head of household, the third column should be left blank

Questionnaire Number

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D. Demographic Profile

Total Number of Persons in the Family (including HHH) _____

No.	Name (Including HHH)	Relation-ship with HHH	Name of Father /Husband	Age (Yrs)	Gender (M/F)	Marital Status	Education Level	Class (School going child)	Primary Occupation	Secondary Occupation	Special Person (Give Detail)
1.		Self									
2.											
3.											
4.											
5.											
6.											
7.											
8.											

Note: Go to Next Page if HH members are more than 8.

Occupational Codes (See Additional Notes for further explanation):

Income Generating **E-GOV** = Employed in government Sector **E-PVT** = Employed in private Sector **S-ART** = Self-employed, working as artisans
S-LAB = Working as skilled or unskilled laborer **S-STB** = Self owned trade and business **I-FAR** = Income generating farming

Non-income generating **N-FAR** = non income generating subsistence farming **N-LIV** = non income generating livestock rearing

For those not working **UNE** = Unemployed and seeking jobs **NEM** = Not employed willingly **STU** = Student against those still studying and not working

Education Codes **Ill** = Illiterate **Mdr** = Madrassah **No** = No or less than Primary **Prim** = Primary (Class 5 to Class 9)
10 = Matric (Class 10) **Int** = Intermediate (FA/FSc) **Grad** = Graduate (BA/BSc) Other _____

Relationship Self-Father Mother Husband Wife Brother Sister Son Daughter Grandson Granddaughter Daughter-in-law Other**Marital Status** Married Unmarried Widowed Divorced**Age** Enter whole number only. Round off, where needed; Enter Zero "0" for infants less than 6 months and "1" for infants between 6 months and a year.

Questionnaire Number

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No.	Name (Including HHH)	Relation-ship with HHH	Name of Father /Husband	Age (Yrs)	Gender (M/F)	Marital Status	Education Level	Class (School going child)	Primary Occupation	Second-ary Occu-pation	Special Person (Give Detail)
9.		Self									
10.											
11.											
12.											
13.											
14.											
15.											
16.											

Do you have servants, tenants, or other workers living with you? If yes please provide the details

No.	Name	Job	Age (Yrs)	Gender (M/F)	Marital Status	Education Level	Is he/she paid in cash or in kind or both?
1.							
2.							
3.							

If the respondent is not part of the household (as listed in Demographic Profile Table) what is his place of residence?

Settlement: _____ Mauza: _____

Questionnaire Number

--	--	--	--

E. Housing

Ownership Status? Owned Rented Free Others _____**Construction** Pucca (Bricks/blocks/stones) Semi Pucca Katcha Others _____

Storeys _____ Number of rooms in the house (including bedrooms) _____

Number of bedrooms _____ Number of bathrooms/toilets _____

Number of kitchens _____ Number of rooms/sheds for animals? _____

Approximate plot size of the house (State units) _____

Approximate covered area (State units) _____

When was the house constructed? _____

Covered area is the area of all floors in the house. Plot size is the size of land on which the house is built and includes the court yard, out houses, driveway etc.

F. Available Facilities in the House

Do you have Telephone Connection (landline)? Yes No If "Yes", when connected (Year)? _____Do you have electricity connection? Yes No If "Yes", when connected (Year)? _____Do you have Sewerage System? Yes No

Sewerage system includes constructed septic tanks and soak pit

Drinking Water Source

 Spring Groundwater River/Stream Open Pond

Water Supply System from the source

 Pipe Electric Pump Hand pump Carried on Animals
 Carried by Family Tankers Open channel Others _____

G. Fuel Sources and Consumption

Type	Y/N	Average Bill/expense (per month)		Units Consumed per Month (mention units)		Source (For LPG, Purchased wood, and Kerosene, the Location of Market; For Gathered Wood, Area where gathered)	Uses			
		Winter	Summer	Winter	Summer		L	SH	W H	C
Electricity						X				
Fuel wood (Gathered)		X	X							
Fuel wood (Market)										
LPG										
Kerosene										
Other										

L: Lighting SH: Space heating WH: Water heating C: Cooking

Questionnaire Number

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H. Social Profile

Religion _____ Caste _____ Mother Tongue _____

Do you marry children outside your tribe/clan? Yes No

How many of the married members of the HH are married to their first cousins? _____

I. Decision Making

Who takes decision in the family on the following issues, and how?

Issue	How the decision is taken	If unilateral who takes the decision? (Indicate member no) If consultative, list the members consulted
Household budget management	<input type="checkbox"/> Unilateral <input type="checkbox"/> Consultative	
Family conflicts	<input type="checkbox"/> Unilateral <input type="checkbox"/> Consultative	
Matrimonial decisions	<input type="checkbox"/> Unilateral <input type="checkbox"/> Consultative	Are daughters consulted in their marriage? <input type="checkbox"/> Yes <input type="checkbox"/> No
Property and asset management and inheritance	<input type="checkbox"/> Unilateral <input type="checkbox"/> Consultative	

J. Migration Patterns

Years since settled in settlement: _____

If less than 10 years, then previous location: _____

Purpose of relocation from previous place: _____

K. Family Health

Births and Deaths

Number of births in the family in last 2 years Live _____ Stillbirth _____

Deaths in the family in the last 2 years

No	Age	Cause
1		
2		
3		
4		

Questionnaire Number

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Serious illnesses

Did any of your family members suffered from any serious illnesses during the past 2 years?

<i>Person</i>	<i>Illness</i>	<i>Outcome</i>	<i>Treatment Type</i>	<i>Treatment Location</i>	<i>Estimated cost of treatment</i>	<i>Who paid for treatment?</i>

Illness: Tuberculosis, Hepatitis, Asthma, Jaundice, Tetanus, Paralysis, Diabetes, Cancer, Heart disease, Others (specify)

Outcome: Treated, Persisting, Disability, Lost job or occupation, Death

Treatment Hospitalization, OPD/Clinic, Herbal/Hakeem, Faith healer, Homeopath, Other (specify)

Accidents

Did any of your family members suffered met an accident during the past 2 years?

<i>Person</i>	<i>Accident</i>	<i>Outcome</i>	<i>Treatment Type</i>	<i>Treatment Location</i>	<i>Estimated cost of treatment</i>	<i>Who paid for treatment?</i>

Accidents: Fall from height, Snake bite, Road accident, Burns, Electrocution, Accident at work, Other (specify)

Outcome: Treated, Persisting, Disability, Lost job or occupation, Death

Treatment Hospitalization, OPD/Clinic, Herbal/Hakeem, Faith healer, Homeopath, Other (specify)

Questionnaire Number

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Common illnesses

Are the following illnesses common in your family in the specified category (Yes/ No)

<i>Common Diseases</i> (عام بیماریاں)	<i>Men</i> (مرد)	<i>Women</i> (خواتین)	<i>Adult-Children</i> (6 to 14) (بالغے)	<i>Children</i> (0 to 5) (بچے)
Tuberculosis				
Diarrhea				
Breathing problems				
Jaundice				
Skin diseases				
Cold and flu				
Stomach diseases				
Joint aches				
Tetanus				
Paralysis				
Diabetes				
Cancer				
Heart problems				
Other (specify)				

L. Family Assets**Appliances**

If you own any of the following in your house, Please give the quantity.
(Write quantity in figures in front of each item)

Television _____ Radio _____ Elec Room Heater ___ Elec water heater ____
 Refrigerator _____ Freezer _____ Washing Machine ___ Elec Iron _____
 Electric Fan _____ Sewing Machine ___ Generator _____ Computer _____

Vehicles

If you own any vehicles, please provide the details:

<i>Type</i>	<i>Make (Year)</i>	<i>Model</i>	<i>Year Purchased</i>	<i>Current Value</i>	<i>Use (Commercial/ Personal)</i>

Include cars, motorcycles, trucks, pick-up, etc.

Questionnaire Number

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Livestock

Number of Livestock heads of each type owned by you.

Type	Buffalo	Cow	Calf	Goat/ Sheep	Lamb	Oxen	Donkey	Horse	Chicken	Others (specify)
Number										
Use										
Purpose										
Value Rs./Unit										
Income (State monthly or annual)										

Number: If the family does not own any animal, enter "Nil". Do not leave blank.
 Use: **S**: Self **C**: Commercial **B**: Both
 Purpose: **Egg** Production, **Milk** Production, Rearing for **Meat**, Carrying **Load**, **Riding**, etc.
 Note: Annual Income should be zero if the livestock is only for self-use.

Are the animals sent for grazing? Yes No. If yes, where _____Are the animals given fodder? Yes No. If yes, what is the monthly cost? _____

Estimated monthly expenses on grazing, feed, fodder and medicine _____

Land holding

Serial	Land Use	In this village (mention units)	Overall Land (mention units)
1	Cultivated area		
2	Uncultivated area		
3	Banjar jadeed (بنجر جديد)		
4	Banjar qadeem (بنجر قديم)		
5	Ghair mumkin (غير ممكن)		
6	Fruit orchard area		
7	Other _____		
8	Other _____		
	Total		

Farming implementsDo you own any farming implements? Yes No. If yes, Plough for oxen Plough for tractor Spray machine Tractor Thresher Other _____

Questionnaire Number

--	--	--	--

M. Farming

Agriculture

No.	Crop	Season	Area under Cultivation (Specify units)	Yield / Units	Percent Sold in market	Percent Self consumed
1	Wheat					
2	Maize					
4	Vegetables					
5	Fodder					
6	Other _____					
7	Other _____					

What is the annual expenditures to grow crops in your land? Rabi _____ Kharif _____

What is your average seasonal earning (PKR/Season)? Rabi _____ Kharif _____

Fruit Trees

No.	Tree	Number of trees	Annual Production (Specify units)	Percent Sold in market	Percent Self consumed
1	Banana (کیلا)				
2	Mulberry (شہتوت)				
3	Apple (سیب)				
4	Persimmon (املوک)				
5	Loquat (لوکاٹ)				
6	Walnut (اخروت)				
7	Apricot (خوبانی)				
8	Peach (اٹرو)				
9	Orange (مالٹا)				
10	Plum (الوجہ الوبخارا)				
11	Other _____				
12	Other _____				

What is annual expenditures to grow fruits? _____

What is your average annual earnings from fruits? _____

Questionnaire Number

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N. Comments and Notes

Additional Notes

Table D. Demographic Profile

Column 9 — Class (In case of School going): For all children (15 years or less) either enter the class in which the child is studying or "Nil" in case the child is not going to school.

Special persons Persons with physical or mental disabilities

Occupational Codes: **For income generating occupations**

E-GOV = Employed in **government** Sector—Person employed for a salary by the government. Includes, for example, armed forces, school teachers, forest guards, and service in the municipal and tehsil administration

E-PVT = Employed in **private** Sector— Person employed for a salary by a non-governmental organization on any kind of job. Includes, for example, working for NGOs, private schools, and private clinics

S-ART = Self-employed, working as **artisans**. Earning depends on output of work. Includes, for example, carpet weaving, handicraft making,

S-LAB = Working as skilled or unskilled **laborer**. Includes, for example, farm labors, off-farm labors, electricians, plumbers, mechanics, mason, and bricklayers, well-diggers

S-STB = Self owned **trade and business**. Includes, for example, doctors, all shop owners, barbers, livestock traders, tailors, ...

For non-income generating activities

N-FAR = non income generating subsistence farming

N-LIV = non income generating livestock rearing

For those not working

UNE = Unemployed and seeking jobs

NEM = Not employed willingly i.e., of their own choice (can include elderly)

STU = Student against those still studying and not working

Date

DD

MM

YY

Questionnaire No.

**This section should be filled separately for every family
(defined as persons who maintain separate accounts)**

O. Family Economics

Indebtedness

Do you owe any money to others or institutions?

 Yes

 No

If "Yes", provide details as below:

<i>Source</i>	<i>Year Borrowed</i>	<i>Amount Borrowed (PKR)</i>	<i>Purpose</i>	<i>Amount Yet to Return (PKR.)</i>
NGO/Bank (specify)				
Friends/relatives				
Moneylender				
Shopkeeper				
Others _____				

Household Income (Average over last year)

<i>Source</i>	<i>Average (Rs.)</i>	<i>Monthly/Annual</i>
Salaried Jobs including remittances and pensions		
1.		
2.		
3.		
Family Sources		
Farming		
Livestock		
Business		
Rent		
Arts and craft making		
Other (please specify)		

Date

DD

MM

YY

Questionnaire No.

Expenditures (Average over last year)

<i>Heads of Expenditure</i>	<i>Average (Rs.)</i>	<i>Monthly/Annual</i>
Food		
Clothing		
Combustion fuel (gas, kerosene, fire wood, etc.)		
Rent or expenditure on dwelling		
Veterinary fees and medicines		
Electricity charges		
Medical		
Education		
Communication		
Transportation		
Social obligations (alms, charity, gifts, burials, weapons, litigations etc.)		
Farm related expenditures		
Other expenditures (Please specify heads below)		

Interviewer

Signature:

Name:

Date

DD

MM

YY

Questionnaire No.

Key Informant Questionnaire - Fishing

Information on Fishing

Investigator _____ Coordinates _____
:

Name of Respondent _____ Contact: _____

Site of fishing, _____
indicate all

Name nearest settlement to site of fishing. _____

What is the total fish catch in a year (specify unit)? _____

Duration of fishing season (months) _____

Characterize your fishing as: small-scale mid-scale large-scale

How many other such fishermen are there in this survey zone?

Provide distribution of fish catch by fish species

<i>Species</i>	<i>Fish catch (per season) (KG)</i>	<i>Average weight/fish (KG)</i>	<i>Proportion self-consumed (%)</i>	<i>Unit Price (specify unit)</i>

If you sell fish to a commercial business, then specify business (hotel, market) and its location

Distance from fishing point (km) _____ Mode of transport _____

Quantity sold (kg/season) _____

Do you pay any annual tax for fishing? Yes No

If yes, mention amount (PKR)? _____

Is there any increase in taxes annually? Yes No

If yes, mention %? _____

Date

DD

MM

YY

Questionnaire No.

Provide information about the equipment or means you employ for fishing. Specify if it is yours, rented or shared, and how much of its use is for fishing against other activities. Specify how long does it last and what is its present cost to replace.

<i>Equipment</i>	<i>Number</i>	<i>Ownership (own, rented, shared)</i>	<i>Equipment use for fishing (%)</i>	<i>Durability (years)</i>	<i>Replacement cost</i>

Variable input costs of production (processing and transportation)

	<i>Summer</i>	<i>Winter</i>
Labor days required per year		
Proportion of labor hired (%)		
Labor wages (PKR)		
Other, specify		

If the flows in **River Kunhar** were halved or reduced in the dry season what might be the impact on this business, if any:

Angling

If you provide services as an angler or fishing guide for tourists, then please provide the below information for the last year

	<i>Summer</i>	<i>Winter</i>
Number of tourists taken		
Number of days guiding		
Income per day		
Expenditure per day		

Date

<i>DD</i>	<i>MM</i>	<i>YY</i>
-----------	-----------	-----------

Questionnaire No.

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Hotel and Restaurants

Note the distance of the facility from the Kunhar River (km): _____

Is the business dependent on a tributary of Kunhar River? Yes No

If yes, provide name: _____

Characterize your business as: small-scale mid-scale large-scale

How many other similar scale businesses are there in survey zone?

At one time, how many visitors can the business accommodate? _____

Is the property rented or owned? _____

If owned, specify current value (PKR): _____

If rented, specify monthly rent (PKR)? _____

Provide below details for estimating the gross income for the last one year

	<i>Summer Season</i>	<i>Winter Season</i>
Occupancy (average number of people visiting per day)		
Average spending per visitor (PKR)		

Labor costs

<i>Level</i>	<i>Number of person employed</i>	<i>Wage Rate (specify unit)</i>
Daily Wage Labor		PKR /day
Monthly Labor		PKR /month
Other		

Running costs for the last one year

	<i>Cost (specify unit)</i>
Electricity bill	
Food expenses	
Other costs, specify	

Date

DD	MM	YY
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Questionnaire No.

--

Are the river activities and views important for the guests?

Yes

No

If yes, in what manner and to what extent: _____

If the flows in **River Kunhar** were halved or reduced in the dry season what might be the impact on this business, if any:

Date

DD	MM	YY
----	----	----

Questionnaire No.

--

Information on Sand/Gravel/Boulder Mining

Investigator _____ Coordinates _____
 GPS Number _____ Way Point _____
 Name of Respondent _____ Phone Number _____
 Role/Title/Responsibility _____

Where do you mine sand/gravel? Name nearest settlement _____

Characterize your business as: small-scale mid-scale large-scale

How many other similar scale businesses there are in survey zone? _____

How much sand/gravel/boulder are mined yearly (specify unit)? _____

Do you transport sand/gravel/boulder to other locations? Yes No

If yes, specify location: _____

Distance: _____ Mode of transportation _____

Size of source _____ Loading capacity _____

Provide details below

	<i>Summer</i>	<i>Winter</i>
Work period		
a) Daily hours		
b) Day in a month		
c) Months in a year		
Quantity of sand/gravel mined per day (specify unit)		
Sand/gravel price (specify unit)		

What are the reasons for seasonal variation in sand/gravel price? _____

Do you use some of the extracted sand/gravel/boulder for yourself? Yes No

If yes, what proportion is self-utilized? _____

What are its uses? _____

Do you pay any annual tax for sand/gravel/boulder mining? Yes No

If yes, mention amount? _____

Is there any annual increase in taxes? Yes No

If yes, mention %? _____

Provide information about the equipment or means you employ for mining sand/gravel. Specify if it is yours, rented or shared, and how much of its use is for sand/gravel mining against other activities. Specify how long does it last and what is its present cost to replace.

<i>Equipment</i>	<i>Number</i>	<i>Ownership (own, rented, shared)</i>	<i>Equipment use for sand/gravel mining (%)</i>	<i>Durability (years)</i>	<i>Replacement cost (PKR)</i>

Specify how much is spent on labor and fuel for a day of mining. Indicate seasonal variations, if any.

	<i>Average wages per person (PKR)</i>		<i>Persons hired per day</i>	
	<i>Summer</i>	<i>Winter</i>	<i>Summer</i>	<i>Winter</i>
Labor				

	<i>Price per unit (specify unit)</i>		<i>Units consumed per day</i>	
	<i>Summer</i>	<i>Winter</i>	<i>Summer</i>	<i>Winter</i>
Fuels				

Date

DD

MM

YY

Questionnaire No.

Rural Settlement Questionnaire

Investigator _____ Settlement Name _____
 Coordinates _____ Union Council _____
 Way Point Number _____ Tehsil _____
 _____ District _____

P. Respondent Information

Name(s)	Role/Title/Responsibility	Phone Number

Q. Demography, Ethnicity and Language

Household: A household may be either a single person or a multi-person household. Household members may be related or unrelated and essentially include people who make common provisions for food and other essentials of living and have no usual place of residence elsewhere.

Masonry: Houses with brick walls and concrete or tin roof.

Adobe: Houses made of mud or unbaked bricks of clay and straw.

Total Households _____ Estimated Population _____
 Proportion of Houses Adobe (%) _____ Proportion of Houses Masonry (%) _____

Religion	Muslims	%	Other	%
Ethnic/Religious Groups	<i>Group name</i>	<i>Share in population</i>	<i>Group name</i>	<i>Share in population</i>
		%		%
		%		%
		%		%

Date

DD

MM

YY

Questionnaire No.

<i>Language</i>	<i>Share in population as Primary Language (%)</i>	<i>Share in population as Second Language (%)</i>
Urdu		

Are there any conflicts or issues between religious or cultural groups? If so please specify, including redress mechanisms:

R. Occupational and Income Profile

Employment status in settlement

<i>Employment Status</i>	<i>Share in adult population (%)</i>
Employed	
Unemployed	
Student	
Retired	

Average Household Income

<i>Average monthly income (PKR)</i>	<i>Proportion of Households (%)</i>
Less than 10,000	
10,000 – 25,000	
25,000 – 50,000	
50,000 – 75,000	

Date

DD

MM

YY

Questionnaire No.

More than 75,000

<i>Occupation</i>	<i>Share in employed population (%)</i>	<i>Description (type of occupation)</i>
Private Service ¹		
Agriculture (land owner)		
Agriculture (wage laborer)		
Agriculture (share cropper)		
Fishing (own business)		
Fishing (labor)		
Sand/gravel mining (own business)		
Sand/gravel mining (wage laborer)		
Other wage laborer		Please provide detail on type of labor or industry
Livestock (owner)		
Livestock (herder)		
Business (hotel/restaurant)		
Trade/business		Please provide detail on type of trades
Skilled workers (carpenters, metal workers, plumber electricians etc.)		
Skilled artisans (skilled artisans, painters, weavers, potters etc.)		
Government service (Education)		
Government service (Health)		
Government service (Other)		
Other (please specify)		

S. Crop Production

Total land cultivated in settlement (specify unit): _____

What is the average agricultural land holding per farmer in the settlement (specify unit):

¹ Employment in factories/industries and other businesses in other cities

What is the cropping pattern? Single Cropping Double Cropping_____

Provide information on crop production and income:

Crop name	Season (Summer/Winter)	Total Area Cropped (specify unit e.g. canal or acres)	Yield per unit land (specify unit)	Value of yield per unit (specify units)	Self Consumption (%)	Sold (%)

What is the main water source for irrigation of crops?

- River Streams Groundwater Rain

To what extent does your crop production depend on the river for water or fertile soils?

- Crop Type: _____
- none at all less than 25% 25% 25 to 50%
- 50% 50 to 75% 75% to 100%

- Crop Type: _____
- none at all less than 25% 25% 25 to 50%
- 50% 50 to 75% 75% to 100%

- Crop Type: _____
- none at all less than 25% 25% 25 to 50%
- 50% 50 to 75% 75% to 100%

Does the dependence vary by crop type? Explain how and indicate variations.

Date

DD

MM

YY

Questionnaire No.

T. Livestock

Provide information on livestock rearing

<i>Items</i>	<i>Total no. in settlement</i>	<i>No sold, bartered or consumed in last 12 months</i>	<i>Value per unit (PKR)</i>
Bullock/Buffalo			
Cow			
Goat			
Sheep			
Donkey			
Horse			
Camel			
Poultry			
Other, specify below			

Are livestock used for work? Yes No

If yes, specify type of work and rental rates

<i>Type of Livestock</i>	<i>Type of Work Farming, Transport (people), Transport (goods)</i>	<i>Rental Rates (PKR per day)</i>
Bullock/Buffalo		
Cow		
Donkey		
Horse		
Others:		

What is the main source of water for livestock? Tick multiple, if apply.

Mountain streams River Other _____

What proportion of watering is in the form of drinking at the river?

a. In summer

none at all less than 25% 25% 25 to 50%
 50% 50 to 75% 75% to 100% _____%

b. In winter

none at all less than 25% 25% 25 to 50%
 50% 50 to 75% 75% to 100% _____%

Grade water quality for livestock use for drinking:

- a) Summer Poor Average Good
 b) Winter Poor Average Good

Is the quality of river water affected by the flow rate? If so in what way:

How much time does livestock spend near the river? _____ Hours per day

Is there a risk of livestock drowning during a flood? Yes No

Indicate incidences of drowning that occurred in the last five years:

Are there any conflicts with migratory communities passing through the area (Gujjar Bakarwal)? If so please specify why there are conflicts, and how they are solved:

U. Recreation and Recreational Areas

Are there any riverside recreational facilities in or near the settlement? Yes No

What proportion of the community's recreational activities rely on the Kunhar River (not the tributaries)?

- none at all less than 25% 25% 25 to 50%
 50% 50 to 75% 75 to 100% _____ %

What recreational activities, if any, does the community engage in at the River? Tick all that apply:

- Fishing Boating Eating at Restaurants Picnic
 Other _____

If other, please specify: _____

Date

DD

MM

YY

Questionnaire No.

V. Educational Facilities

Access and Enrolment

Facility Level	Enrolment		Provider (Government, Private, NGO)	Location if outside settlement
	Male	Female		
Primary (Nursery to Class V) for Boys				
Primary (Nursery to Class V) for Girls or Co-Ed				
Middle (Class VI to VIII) for Boys				
Middle (Class VI to VIII) for Girls or Co-Ed				
Secondary (Class IX to X) for Boys				
Secondary (Class IX to X) for Girls				
Intermediate College for Boys/Girls				
Degree College for Boys				
Degree College for Girls				
Technical and Vocational Training Institutes for Boys				
Technical and Vocational Training Institutes for Girls				
<i>Madrasah</i>				
Other				

W. Health

Facility	Provider (Government, Private, NGO, Other)	Location if outside settlement
Dispensary		
BHU		
Health Center		
Rural Health Center (RHC)		
Hospital		
Immunization (eg. Polio drops)		
LHV/LHW		
Trained Midwife (dai)		
Untrained Midwife (dai)		
Pharmacy		
Other		

Health Status

<i>Common Ailment</i>	<i>Men (proportion affected %)</i>	<i>Women (proportion affected %)</i>	<i>Children (age 15 and below) (proportion affected %)</i>

X. Water Supply and Sanitation

Water Supply (tick all that apply)

- | | |
|---|---------------------------------------|
| <input type="checkbox"/> Public water supply (government/municipal) | <input type="checkbox"/> Well/s |
| <input type="checkbox"/> Spring/s | <input type="checkbox"/> River Kunhar |
| <input type="checkbox"/> Tributaries of River Kunhar | |

Distance of Settlement to Source of Water:

Problems in fetching water & management of source (please specify which source is being referred to):

Typical Sanitation (tick all that apply)

- | | | | |
|--|---|---------------------------------------|---------------------------------------|
| Pit Latrine <input type="checkbox"/> | Pit Latrine with Slabs <input type="checkbox"/> | Septic Tanks <input type="checkbox"/> | Open Latrine <input type="checkbox"/> |
| Municipal Sewage System <input type="checkbox"/> | Open Drains <input type="checkbox"/> | | |
| Others (please mention): _____ | | | |

Date

DD

MM

YY

Questionnaire No.

Y. Fuel Sources and Consumption

Type	Price (Rs per Unit)	Average household usage per month	Source (e.g. grid, power plant, forest, market)	Use (Y/N)			
		(specify unit)		Lighting	Space heating	Water heating	Cooking
Electricity		Rs					
Fuel wood		kg or maund	Forest				
Fuel wood		kg or maund	River				
Fuel wood		kg or maund	Market				
LPG		kg					
Kerosene		Litres					
Diesel		Litres or gallons					
Other							

Z. Infrastructure

	Access (Y/N)	Location if out of settlement	Description
Electricity			
Telephone			
Mobile Phone Service			
Post Office			
Police Station			
Police Check post			
Blacktop Road			
Unsealed Road			
Regular Public Transport Service (Bus, Pick-up, Jeep, Car)			Provide description
Riverside hotels			
Other hotels			
Recreational			Provide description
Bank			
Market			

Date

DD

MM

YY

Questionnaire No.

AA. Migration Patterns

Out-migration:

Has any household migrated from the settlement in the last 7 years? Yes No

If yes, how many: _____ Migrated to: _____

What is the purpose of out-migration?

In-migration:

Has any household settled in the settlement during the last 7 years? Yes No

If yes, how many: _____ Migrated from: _____

What are the reasons for in-migration?

BB. Tangible Cultural Heritage

Are there any archaeological sites, shrines, graveyards, or other areas of cultural significance in the zone? If so, please specify location and significance:

1. _____
2. _____
3. _____
4. _____

CC. Needs Assessment

(In order of importance)

1. _____
2. _____
3. _____
4. _____
5. _____

Appendix M: Background Information Document English

The following document, called the BID (Background Information Document) was prepared to provide an overview of the Balakot Hydropower Development Project (HDIP) or Balakot Hydropower Project (BAHPP) among the stakeholders. It was shared with the stakeholders in March–April 2017 and June–July 2018 during consultations carried out for the EIA (Environmental Impact Assessment) of the Project. Some changes have been made in the Project design since then by the Project design consultants. However, these changes are minor and do not change the environmental and social impacts of the Project outlined in this document.

Introduction

The Pakhtunkhwa Energy Development Organization (PEDO) intends to construct a 300 megawatt (MW) run-of-river hydropower plant Balakot Hydropower Development Project (HDIP) or Balakot Hydropower Project (BAHPP) with related infrastructure at Balakot, Mansehra district of Khyber Pakhtunkhwa (KP), Pakistan. The Project is located on the Kunhar River. The Project will help in meeting the current shortfall and in increasing demand of electricity in the region through economical and sustainable means.

The Project was identified in 1995 under the study “Identification of Hydropower Potential in Kaghan Valley” by Sarhad Hydel Development Organization (SHYDO) with the technical collaboration of the German Agency for Technical Cooperation (GTZ) as a 190 MW HPP. A Feasibility Study of the Project¹ (FS) was released in October 2013, which included an environmental and social impact assessment section. However, as the Project is being financed by the Asian Development Bank (ADB), it has contracted the services of Hagler Bailly Pakistan (Pvt.) Ltd. (HBP) to carry out an environmental impact assessment (EIA) of the Project and develop a Land Acquisition and Resettlement Plan (LARP) which meets the standards and guidelines prescribed by ADB, and conforms to environmental legislation of KP.

As part of the EIA process, consultations are undertaken with communities and institutions that may have interest in the Project or may be affected by the Project (the “Stakeholders”) to record their concerns and to address them in the course of project design and preparation of the EIA. The previous EIA effort included consultations with stakeholders. As part of a due diligence, consultations are being carried out with community stakeholders, as well as with institutional stakeholders that would like to be re-consulted, and institutional stakeholders that are important and were not previously consulted.

For informed consultations with stakeholders, this Background Information Document (BID) has been prepared to provide information on the project design, its setting, EIA

¹ Mirza Associates Engineering Services (Pvt.) Ltd. (Lead Consultant), December 2013, Feasibility Study of Balakot Hydropower Project, Volume I Main Report for Pakhtunkhwa Hydel Development Organization

process, potential impacts that will be the subject of the Study, and the process to be followed for environmental impact assessment.

The BID is subject to changes as further information on some aspects of the Project become available during the course of the EIA.

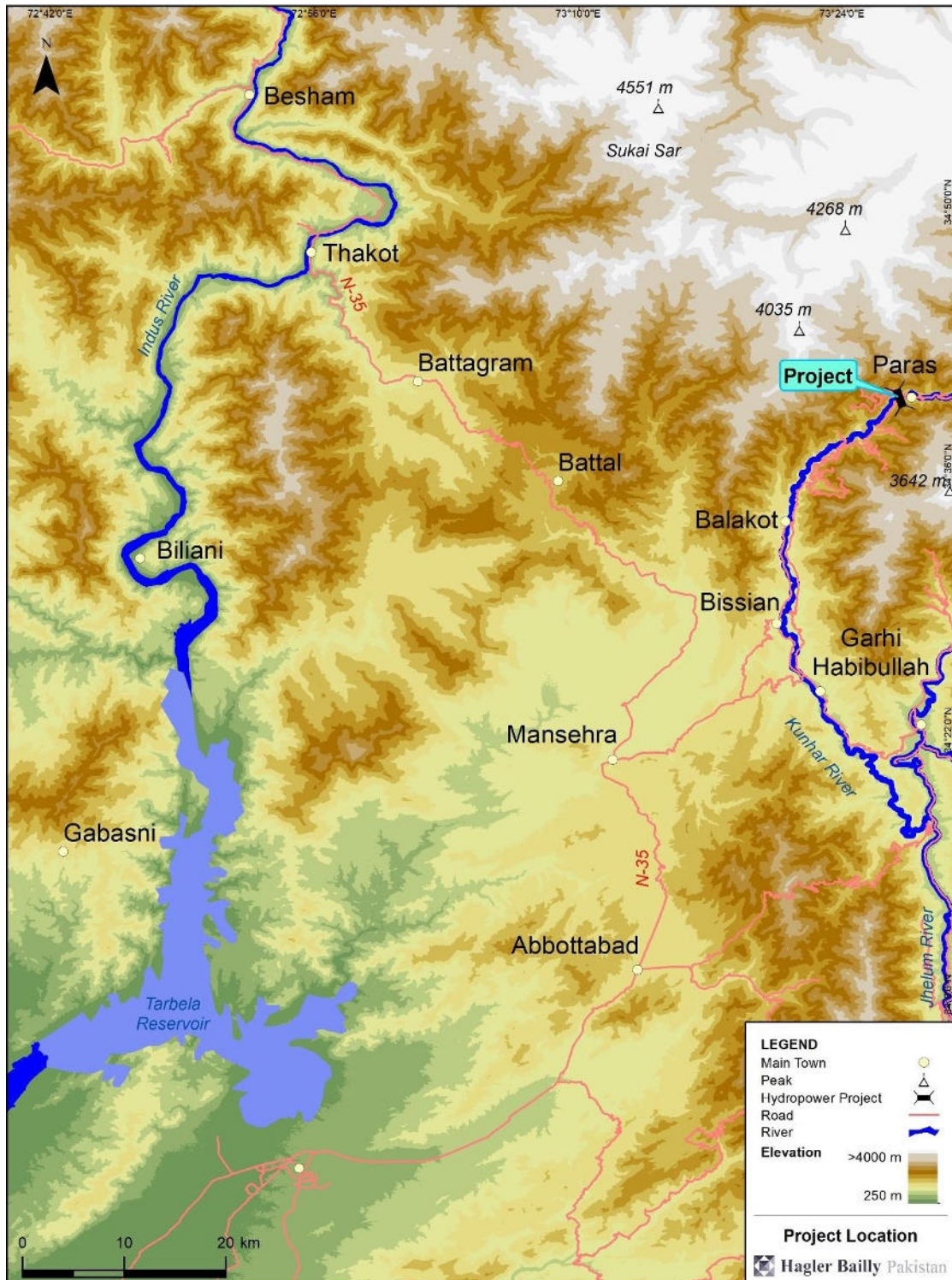
Project Setting

The Project is located on the Kunhar River in the Khyber Pakhtunkhwa (KP) province of Pakistan, in the 12 km stretch from Paras to Sangar Village. The hydel power potential available in the 20 km stretch of the river from Paras to Sangar tributary will be utilized for the Project.

A map showing the location of the Project is provided in **Exhibit M.1**.

All parts of the Project are located on the left bank of the Kunhar River. The dam site (34° 38' 59"N, 73° 26' 19"E) is about 17 km upstream of the town of Balakot. The powerhouse (34° 36' 14"N, 73° 22' 50"E) is located 10 km upstream of Balakot, near Kapi Gali Village.

Exhibit M.1: Project Location



Project Outline

The layout of the Project is provided in **Exhibit M.2**. The main components of the Project are described briefly in **Exhibit M.3**.

Exhibit M.2: Project Layout

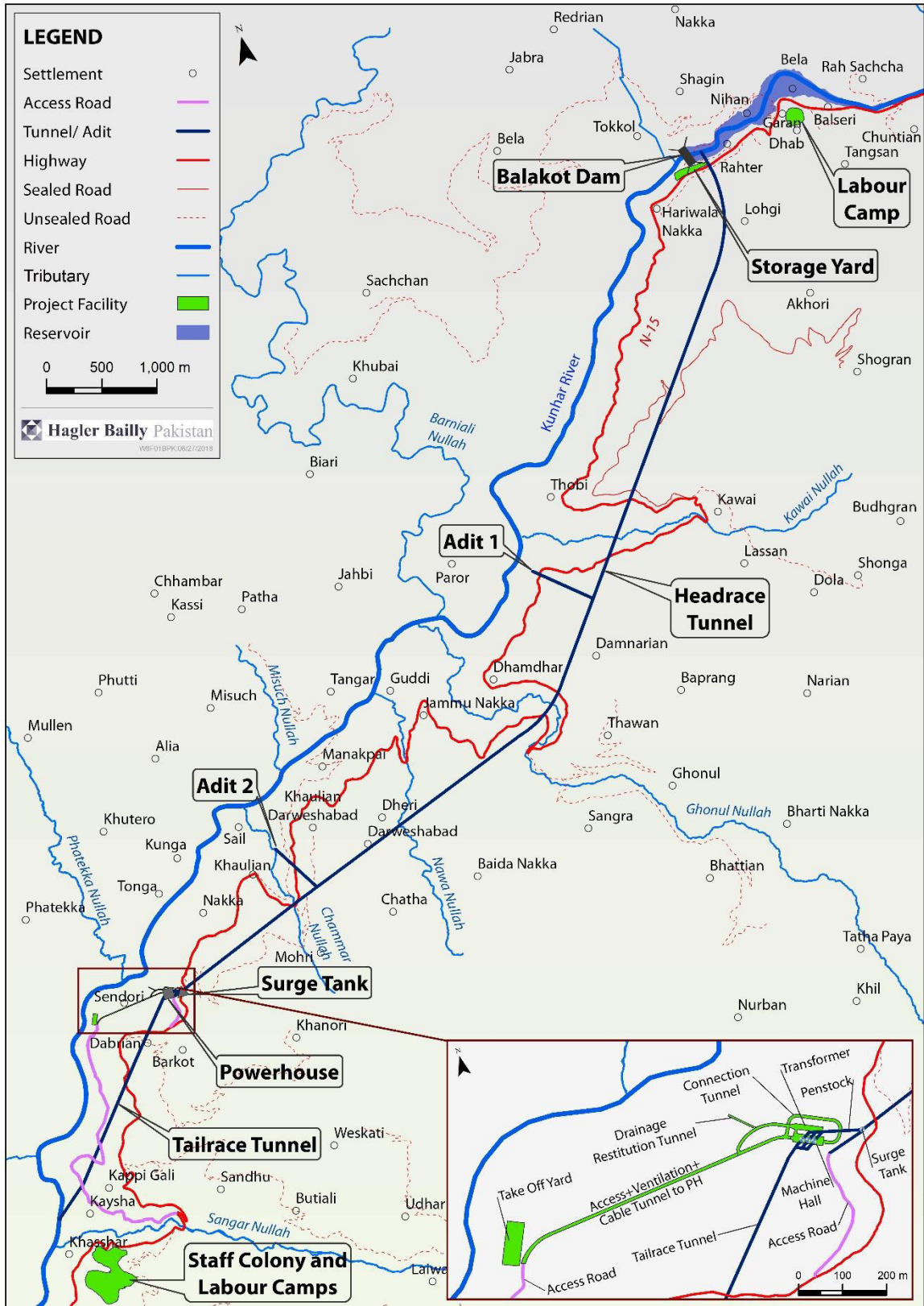


Exhibit M.3: Description of the Project and Facilities

Main Dam

It will be a concrete gravity dam, having a height of 78 m from the river bed, comprising low level/flushing outlets and a gated spillway. It will be equipped with five hydraulically operated radial gates for flood discharge and are set at the crest level of 1,276 meters above sea level (m.a.s.l.). Three circular bottom outlets of diameter 5 m will be provided near the river bed for sediment flushing.

Lateral power intake structure

This will be located on the left bank of river. It will comprise three intakes to take the design discharge. A rectangular 8 m wide by 8 m high control gate equipped with upstream sealing will be provided.

Low pressure headrace tunnel

This will be of length 8,420 m and diameter of 8 m. It will be optimized for considering different diameters for the design discharge

Power Complex

An underground power complex has been proposed which will consist of an underground powerhouse cavern, a GIS transformer cavern, a main access tunnel, cable and ventilation tunnel and an open switchyard. The powerhouse will be 83.2 m long, 16.2 m wide and 25 m high from the main inlet valve floor to the arch roof crown.

Key Operational Characteristics

The maximum and minimum reservoir operating levels will be 1,288 m.a.s.l and 1,283 m.a.s.l respectively. The installed capacity will be 300 MW with mean annual energy output (average 51 years) of 1,187 GWh. Sediment flushing will be carried out every year during the summer months, when discharge is above 154 cubic meters per second (cumecs). During the low flow periods, the live storage will be used to store water during off peak hours to improve the flows for power generation in peak hours. It has been estimated that 2.566 million m³ storage would provide additional flows in four peak hours.

Land Acquisition

The Project will require land acquisition of approximately 137.5 acres. Of this 127.5 acres is for the powerhouse and reservoir while 10 acres is for the Project facilities (including staff colonies). An additional 10 acres will be acquired temporarily for labor camps and contractor offices.

Construction, Requirements and Waste

The total construction period of this Project will be 5 years (60 months).

Materials required to carry out the construction of civil works for the project include concrete aggregate, cement, pozzolans, various types of fill materials, construction chemicals, steel products etc. Deposits for course aggregates have been identified upstream and downstream of the dam site at Mahandri and Paras. Fine aggregate deposits have been established at Paras, Chitta Katha, and Garhi Habibullah. Fine aggregates are being mined in these areas for local use. These sources have a strong potential of being developed into a viable source of fine aggregates. Marble and limestone outcrops are exposed along the road while traveling from the proposed dam site to Naran. These are considered for development of rock quarry for obtaining course aggregates.

Approach to the EIA and LARP

The EIA will be undertaken in compliance with relevant national legislation and keeping in view ADB requirements. The major components of the study include:

- ▶ baseline studies to characterize the existing ecological environment in the project area;
- ▶ a public consultation process to ensure that project stakeholders are informed of the project development plan and have an opportunity to influence it;
- ▶ an analysis of the physical, ecological and socioeconomic impacts of the project, both negative and positive; and,
- ▶ suggested mitigation measures to address the identified adverse impacts.

Separate to the EIA settlement level consultations and surveys, household level consultations and surveys, of land owners and households, will be carried out in the areas identified for land acquisition by PEDO to develop the Resettlement Action Plan for the Project.

A brief overview of the conceptual components of an EIA process is given in **Exhibit M.4**, whereas the detailed process to be followed for the study of ecological impacts of the Project is provided in **Exhibit M.5**. A preliminary list of potential environmental and social impacts of the Project and a list of biodiversity issues that will be investigated during the EIA are provided below.

List of potential environmental and social impacts

- ▶ Provision of employment to people
- ▶ Creation of service-sector jobs, procurement of consumables and the outsourcing to local service providers.
- ▶ Construction related impacts such as noise and dust
- ▶ Reduction in power outages and revival of the affected economies
- ▶ Increase in traffic due to Project related transportation
- ▶ Disturbance due to blasting, dust, noise, vibration, road congestion, and safety hazard from heavy traffic
- ▶ Damage to infrastructure due to blasting and noise nuisance due to blasting, drilling and batching plant
- ▶ Changes to existing social and cultural norms
- ▶ Pressure on existing infrastructure as a result of influx of job seekers
- ▶ Impact on sand mining and gravel extraction
- ▶ Contamination of soil
- ▶ Transformation of landscape
- ▶ Physical displacement of some households resulting in disruption of existing socioeconomic setup

List of potential biodiversity issues

- ▶ Reduction in water quality and quantity
 - ▶ Changes in sediment load of river
-

-
- ▶ Changes in the geomorphology of the river
 - ▶ Fragmentation of fish habitat
 - ▶ Damage to natural flora and fauna and river ecosystem
 - ▶ Impact on endangered and migratory species
-

As impacts on the aquatic ecology due to the project are of importance, HBP, in collaboration with Southern Waters Ecological Research and Consulting, will employ the DRIFT (Downstream Implications of Flow Transformation) Decision Support System (DSS) approach to assess the changes in flow regime of the river on fish and other river dependent wildlife. DRIFT is a holistic approach that employs a multidisciplinary team to analyse the likely effects on a range of flow scenarios, and has been tested in Himalayan rivers. The DRIFT Process is shown in **Exhibit M.6**. Its aim is to predict changes in the form of three streams of information—ecological, economic and social—that represent the three pillars of sustainable development. It incorporates a custom-built Decision Support System (DSS) that holds all the relevant data, understanding and local wisdom about the river provided by the team of river and social specialists.

The four main aims incorporated into the DRIFT process are to:

- ▶ Synthesize present relevant knowledge on the river ecosystem;
- ▶ Synthesize present relevant knowledge on use of the river;
- ▶ Predict how the river ecosystem could change with water-resource development; and
- ▶ Predict how these river changes could affect people and the economy.

Exhibit M.4: Conceptual framework of EIA figure.

<i>Component</i>	<i>Main purpose</i>	<i>Activities related to Stakeholder Consultations</i>
Scoping	<ul style="list-style-type: none"> ▶ Identify the issues on which the EIA should focus. ▶ Identify project alternatives that should be evaluated during the course of the EIA. 	<ul style="list-style-type: none"> ▶ Identify institutional and community stakeholders ▶ Engage stakeholders and record issues raised ▶ Provide feedback to the EIA team to incorporate stakeholders' concern in baseline investigations and impact assessment
Baseline investigations	<ul style="list-style-type: none"> ▶ Collect background information on the environmental and social setting of the project. 	<ul style="list-style-type: none"> ▶ Incorporate additional issues raised during the baseline survey

<i>Component</i>	<i>Main purpose</i>	<i>Activities related to Stakeholder Consultations</i>
Impact assessment, studies	<ul style="list-style-type: none"> ▶ Define the potential impacts of the project ▶ Undertake specialist investigations to predict changes to environment due to the project ▶ Determine the significance of the potential impacts ▶ Identify measures for the management of the impacts ▶ Determine the residual impacts of the project after incorporation of the management measures. ▶ Evaluate the overall acceptability of the project (from environmental and social perspectives). 	<ul style="list-style-type: none"> ▶ Assess issues raised by stakeholders
Mitigation Measures and management plan	<ul style="list-style-type: none"> ▶ Environmental mitigation and monitoring plan will describe the measures proposed to ensure implementation of the mitigation measures identified during the impact assessment. It will include, for example, specific designs and plans, training requirements, resource requirements, monitoring details (sampling locations, methodology, and frequency), review and reporting requirements and budget. 	<ul style="list-style-type: none"> ▶ Assess the acceptability and practicability of the proposed mitigation measures
EIA Report Preparation	<ul style="list-style-type: none"> ▶ After the studies, the EIA team will pull together the detailed assessment of impacts and mitigation measures. This may involve liaison with various specialists to ensure correct interpretation of information and compile EIA report. 	<ul style="list-style-type: none"> ▶ Provide stakeholders with a feedback on the EIA specifically communicate how the project proponent proposes to address the issues raised by the stakeholders.
EIA submittal to regulatory authorities and decision making	<ul style="list-style-type: none"> ▶ Submittal and review of the EIA report by regulatory authorities and other interested stakeholders. The reviewers will inform about their decision on the acceptability of the Project from environmental and social perspectives and the conditions of approval for the development 	<ul style="list-style-type: none"> ▶ Attend the public hearings and respond to the issues raised during the public hearings.

Exhibit M.5: Biodiversity Assessment and Management Process figure.

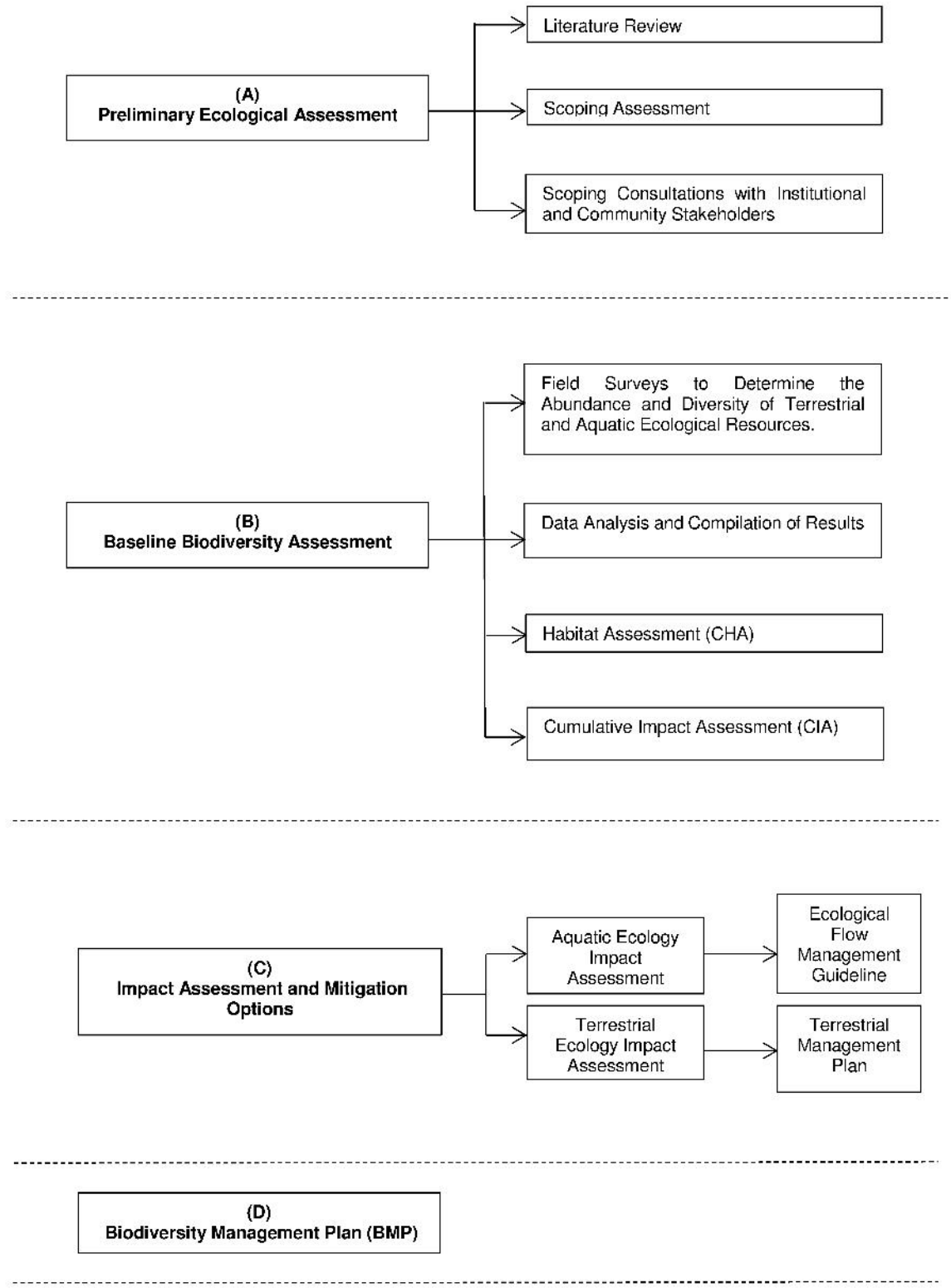
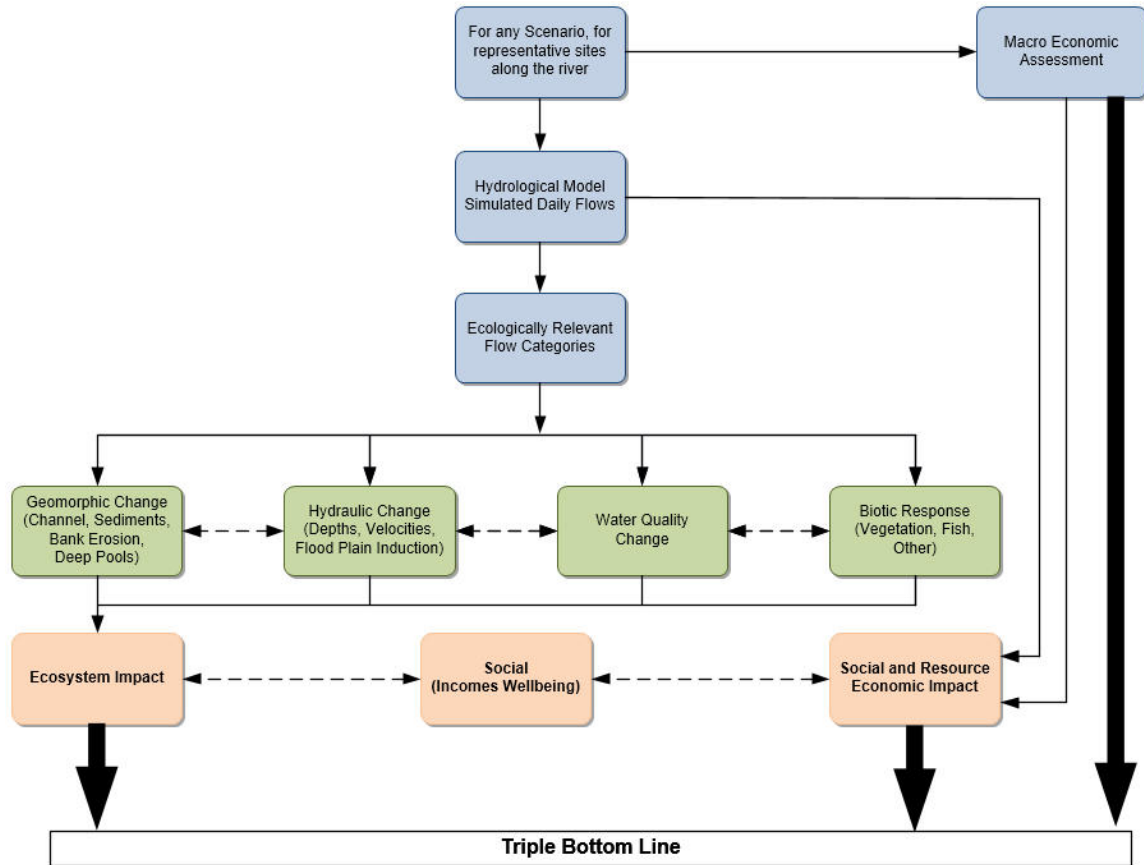


Exhibit M.6: Integrated Scenario Based Approach (DRIFT DSS)



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Appendix N: Background Information Document Urdu

ہائیڈرو پاور ڈویلپمنٹ انویسٹمنٹ پراجیکٹ ماحول پر اثرات کا جائزہ بنیادی معلومات

تعارف:

پختونخواہ انرجی ڈویلپمنٹ آرگنائزیشن (پی ای ڈی او) (Pakhtunkhwa Energy Development Organization) (PEDO)، خیبر پختونخواہ، پاکستان کے ضلع مانسہرہ میں بالا کوٹ کے مقام پر ایک 300 میگا واٹ کاپن بجلی گھر (پروجیکٹ) ہائیڈرو پاور ڈویلپمنٹ انویسٹمنٹ پراجیکٹ (ایچ ڈی پی پی) یا بالا کوٹ ہائیڈرو پاور پروجیکٹ (بی ایچ پی پی) کی تعمیر کرنے کا ارادہ رکھتی ہے۔ پروجیکٹ کنہار دریا پر بنے گا اس پروجیکٹ کی وجہ سے موجودہ شارٹ فال پورا کرنے میں اور بجلی کی بڑھتی ہوئی مانگ پورا کرنے میں مدد ملے گی اور خطے میں اقتصادی پائیداری بڑھے گی۔

پیڈو جس کا اُس وقت کا نام سرحد ہائیڈرو پاور ڈویلپمنٹ آرگنائزیشن (SHYDO) تھا جرمن ایجنسی (GTZ) کے تکنیکی تعاون سے 1995 میں ایک سٹڈی کی اور 190 میگاواٹ کے 5 وادی کاغان میں شناخت کیے۔

اس منصوبے کے ایک امکانات 5 سٹڈی اکتوبر 2013، میں کی گئی۔ جس میں ماحولیاتی اور سماجی اثرات ہیں۔ اس پروجیکٹ کے لئے ایشیائی ترقیاتی بینک (ADB) کی طرف سے مالی مدد کی جا رہی ہے۔ ADB نے اس پراجیکٹ کی وجہ سے ماحول پر اثر کا جائزہ اور زمین کے حصول اور لوگوں کی منتقلی کا پلان بنانے کے لئے ہیگلر بیلی پاکستان (Hagler Bailly Pakistan-HBP) کی خدمات حاصل کی ہیں۔ HBP یہ کام ایشیائی ترقیاتی بینک (Asian Development Bank-ADB) کے اصولوں اور معیار کے مطابق اور خیبر پختونخواہ (کے پی) کی ماحولیاتی قانون سازی کے مطابق کر رہا ہے

حیاتیاتی ماحول پر اثرات کے جائزے کا ایک جزو منصوبے سے ممکنہ طور پر متاثر ہونے والے اور منصوبے میں دلچسپی رکھنے والے افراد (یعنی اسٹیک ہولڈرز) سے مشاورت کرنا، ان کے خدشات کو قلمبند کرنا اور ان کو حل کرنا ہے۔ یہ دستاویز مشاورت کے لئے اسٹیک ہولڈرز کو معلومات دینے کے لئے تیار کی گئی ہے۔ پچھلے جائزے (EIA) میں اسٹیک ہولڈرز سے مشاورت بھی شامل تھی تاہم پراجیکٹ کے ڈیزائن میں تبدیلی اور ADB کے اصولوں کو مد نظر رکھ کر دوبارہ تجزیہ کرنے کی ضرورت محسوس کی گئی ہے۔

اسٹیک ہولڈرز کے ساتھ متعلقہ مشاورت کے لئے، یہ تفصیلی معلومات (Basic Information Document) بنیادی معلومات کی

دستاویز تیار کی گئی ہے۔ اس دستاویز میں پراجیکٹ کا ڈیزائن، ممکنہ ماحولیاتی اثرات اور ماحولیاتی جائزہ کا طریقہ کار واضح کیا گیا ہے۔ تجزیے کے عمل کے دوران پراجیکٹ کے کسی پہلو سے متعلق مزید معلومات حاصل ہونے یا تبدیلی کی صورت میں اس دستاویز میں تبدیلی بھی کی جاسکتی ہے۔

پروجیکٹ کا محل وقوع

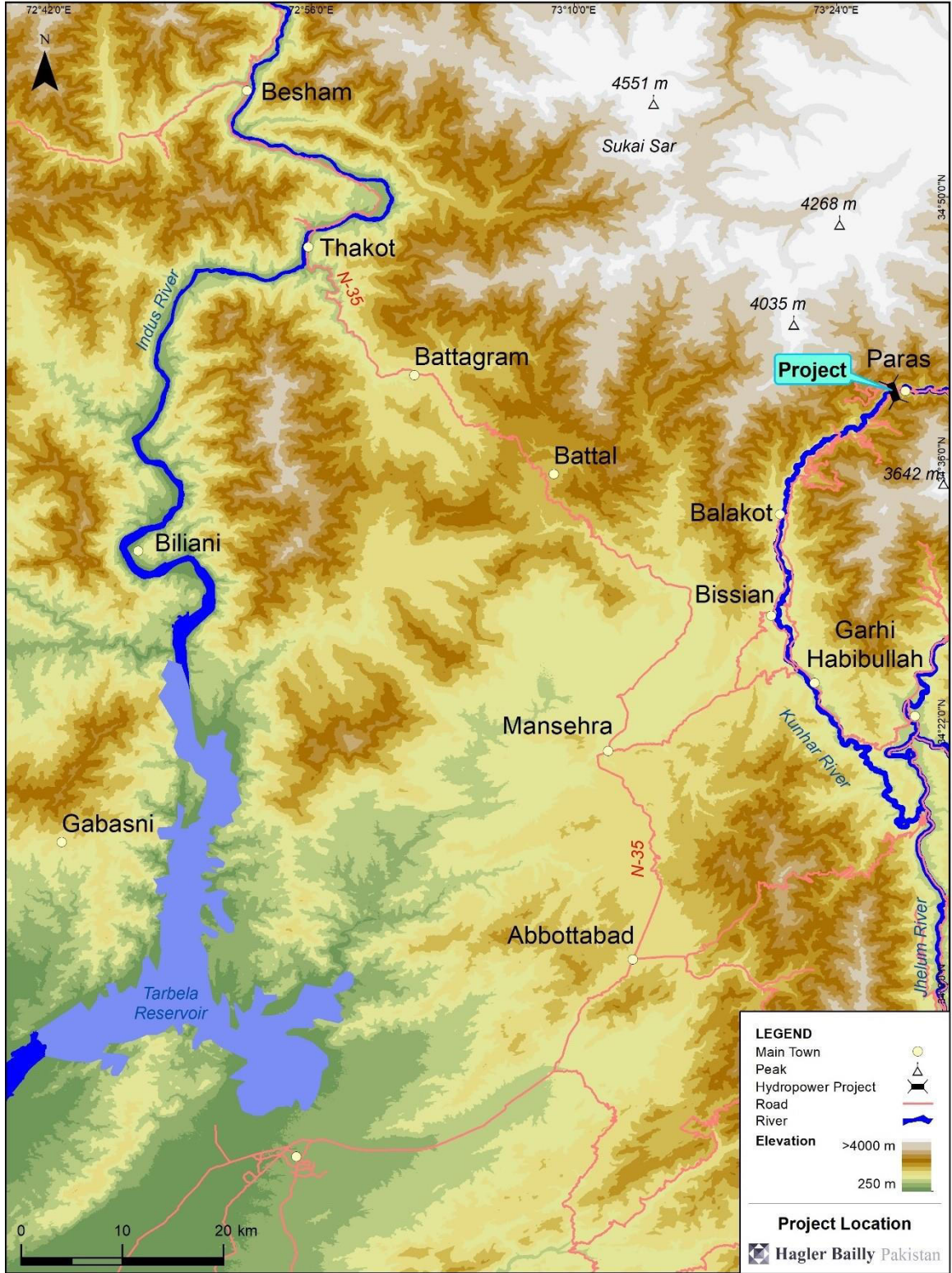
یہ پراجیکٹ پاکستان کے صوبہ خیبر پختونخواہ میں دریائے کنہار پر. پارس اور سانگر گاؤں کے درمیان 12 کلومیٹر پر لگایا جا رہا ہے ۔
20 کلومیٹر طویل مین موجودہ نالے ممکنہ منصوبے کے لئے استعمال کئی جائیں گی ۔
پراجیکٹ کا علاقہ **شکل نمبر 1** میں دکھایا گیا ہے۔۔

منصوبے کی تمام تعمیرات کنہار دریا کے بائیں کنارے پر واقع ہیں. ڈیم سائٹ ($34^{\circ} 38' 59''N$, $73^{\circ} 26' 19''E$) بالاکوٹ شہر سے اوپر 17 کلومیٹر کے فاصلے پر اور پاور ہاؤس ($34^{\circ} 36'$, $73^{\circ} 22' 50''E$) 10 14" N, 73° 22' 50" E کے فاصلے پر کچی گلی گاؤں کے قریب واقع ہے

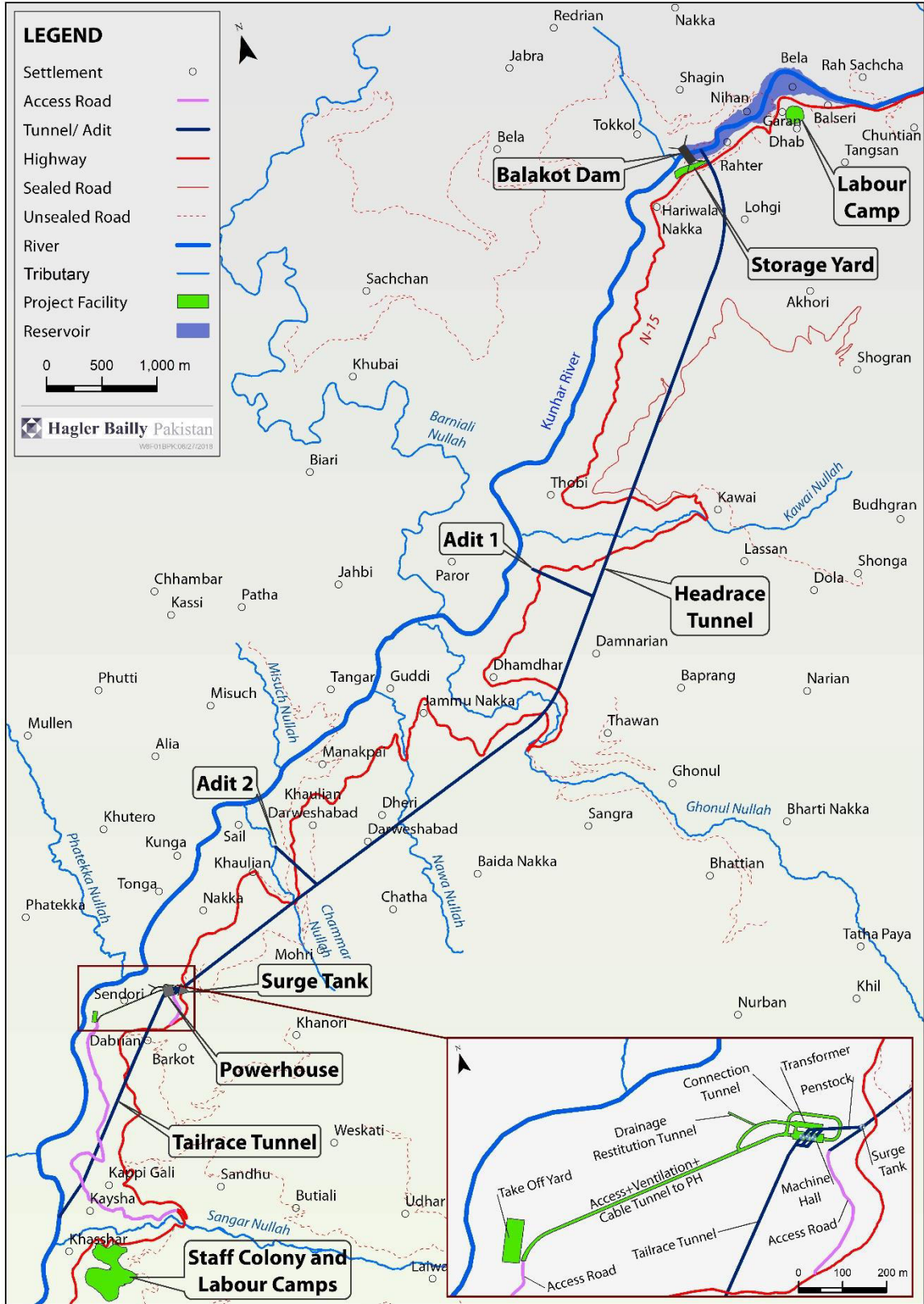
پراجیکٹ کا خاکہ

پراجیکٹ کی تنصیبات **شکل نمبر 2** میں دکھائی گئی ہیں اس پراجیکٹ کی تنصیبات کی تفصیل **شکل نمبر 3** میں دی گئی ہے ۔

شکل نمبر 1: منصوبے کا محل وقوع



شکل نمبر 2: ہائیڈرو پاور ڈویلپمنٹ انویسٹمنٹ پراجیکٹ کی تنصیبات کا خاکہ



شکل نمبر 3: تنصیبات پر تفصیلی معلومات

ڈیم

یہ ڈیم کنکریٹ سے بنے گا جس کی اونچائی دریا کے بیڈ سے 78 میٹر ہوگی اس میں نیچلی طرف صفائی کی لیئے اوٹ لیٹ ہو نگی اور اوپر کی طرف اسپل وے ہونگے۔ سیلاب کے پانی کے اخراج کے لیے اس میں پانچ دروازے ہونگے جو کہ ہائیڈرولیکل طریقے سے کھلیں گے یہ دروازے سطح سمندر سے 1276 میٹر کی بلندی پر ہونگے۔ پانچ میٹر گولائی کے تین اوٹ لیٹ دریا کے بیڈ کے پاس ریت کے اخراج کے لئے بنائے جائیں گے۔

لٹرل پاور انٹیک اسٹکچر

یہ دریا کے بائیں کنارے پر بنایا جائے گا یہ تین انٹیکس پر مشتمل ہوگا جو کہ مطلوبہ مقدار میں پانی کو خارج کرے گا اس میں ایک 8 میٹر اونچائی اور چوڑائی کا گیٹ دیا جائے گا۔

کم دباؤ کی ہیڈریس سرنگ

یہ 8 میٹر گولائی کی سرنگ ہوگی جس کی لمبائی 8420 میٹر ہوگی یہ پانی کی مختلف مقدار کے اخراج کے لیئے بنائی جائے گی۔

پاور کمپلیکس

ایک زیر زمین پاور کمپلیکس تجویز کیا گیا ہے جو کہ ایک پاور ہاؤس، ایک جی آئی ایس ٹرانسفارمر، ایک رسائی کے لئے سرنگ اور ایک سوئچ یارڈ پر مشتمل ہوگا۔ پاور ہاؤس کی لمبائی 83.2 میٹر ہوگی، چوڑائی 16.2 میٹر ہوگی اور یہ آرچ روف کرائون کی طرف مین انلیٹ والو کے فرش سے 25 میٹر اونچا ہوگا۔

کچھ خاص خصوصیات

جھیل میں پانی کی زیادہ سے زیادہ اونچائی سطح سمندر سے 1288 میٹر ہوگی اور کم سے کم اونچائی سطح سمندر 1283 ہوگی اس پراجیکٹ کے نصب کرنے کے بعد 300 میگاواٹ توانائی پیدا کرنے کی صلاحیت ہوگی۔ 51 سال میں اوسط 1187 GWh سالانہ توانائی پیدا کی جائے گی۔ جھیل سے ریت کا اخراج موسم گرما کے مہینوں میں دوران ہر سال کیا جائے گا جب ڈسچارج فی سیکنڈ 154 کیوبک میٹر سے اوپر ہوگا۔ جب پانی کا کم بہاؤ ہوگا تو اس وقت جمع کیا ہوا پانی، بجلی کی پیداوار اور پانی کا بہاؤ برقرار رکھنے کے لئے استعمال کیا جائے گا اندازے کے مطابق چار گھنٹے میں اضافی بہاؤ فراہم کرنے کے لئے 2.566 ملین کیوب جمع پانی درکار ہوگا۔

زمین کا حصول

اس پراجیکٹ کے لئے تقریباً 137.5 ایکڑ زمین کی ضرورت ہوگی۔ جس میں سے 127.5 ایکڑ پاور ہاؤس اور جھیل کے لئے، 10 ایکڑ پروجیکٹ کے دیگر تعمیرات (اسٹاف کالونی سمیت) کے لئے اور 10 ایکڑ کیمپوں اور ٹھیکیدار کے دفاتر کے لئے عارضی طور پر حاصل کی جائے گی۔

تعمیراتی، کام اور فضلہ

تعمیراتی کام کے لئے پانچ سال (60 ماہ) لگیں گے تعمیراتی کام کے لئے کنکریٹ، ایگریگیٹ، سیمنٹ، پزولان، بھرائی کے مختلف مواد، کیمیائے مواد اور اسٹیل کی مصنوعات وغیرہ کی ضرورت ہوگی، کورس ایگریگیٹ کے زخائر ڈیم سائٹ سے اوپر اور نیچی مہندری اور پارس گاؤں میں شناخت کئے گئے ہیں۔ فائن ایگریگیٹ کے زخائر پارس، چٹاکٹھا اور گڑھی حبیب اللہ میں قائم کئے جائیں گے۔ ان جگہوں پر فائن ایگریگیٹ مقامی استعمال کے لیئے نکالا جا رہا ہے یہ اس قابل ہے کہ فائ ایگریگیٹ کا قابل عمل ذریعہ بن سکے۔

مجوزہ ٹیم سے ناراضی کے طرف سفر کرتے ہوئے ماربل اور چونے کا پتھر نظر آتا ہے، اسے راک کیوٹری بنانے کے لئے سوچا جا رہا ہے۔
جس سے کورس آگریگیٹ حاصل کیا جائیگا۔

ماحولیاتی تجزیے کا طریقہ کار اور منتقلی کا منصوبہ

یہ منصوبہ متعلقہ ملکی ماحولیاتی قوانین اور ایشیائی ترقیاتی بینک کے معیار کے مطابق تیار کیا جائے گا۔ اس منصوبے کے اہم جزو مندرجہ ذیل ہیں۔

- ◀ منصوبے کے ارد گرد موجودہ ماحول کا ایک جامع مطالعہ
- ◀ مشاورت کا عمل تاکہ لوگوں اور اداروں کو منصوبے کے بارے میں آگاہ کیا جا سکے اور ان کو اپنے تاثرات بیان کرنے کا موقع دیا جا سکے
- ◀ منصوبے کے منفی اور مثبت حیاتیاتی ماحول پر اثرات کا تجزیہ
- ◀ شناخت شدہ مضر اثرات سے نمٹنے کے لئے تجویز کردہ اقدامات
- ◀ زمین مالکان اور گھرانوں کے مالکان کے ساتھ مشاورت کر کے سروے کیا جائے گا۔ گھروں اور زمین کے مالکان کے لئے زمین کی نشاندہی کی جائے گی اور PEDO نئی ضروریات کے مطابق دوبارہ منتقلی کا منصوبہ بنائے گی۔

EIA کے پاکستانی اور بین الاقوامی معیار کے مطابق مطالعہ کے طریقہ کار کو **شکل نمبر 4** میں دکھایا گیا ہے۔ جبکہ حیاتیاتی اثرات کے تفصیلی طریقہ کار کو **شکل نمبر 5** میں دکھایا گیا ہے۔ مندرجہ ذیل فہرست ممکنہ سماجی، ماحولیاتی اور حیاتیاتی اثرات کی نشاندہی کرتی ہے۔

ممکنہ ماحولیاتی اور سماجی اثرات کی فہرست

- ◀ لوگوں کو ملازمت کی فراہمی
- ◀ تعمیراتی کام کے اثرات مثلاً شور اور دھول
- ◀ لوڈ شیڈنگ میں کمی اور ملک کی متاثرہ معیشت کی بحالی
- ◀ پراجیکٹ سے متعلقہ نقل و حمل کی وجہ سے ٹریفک میں اضافہ
- ◀ بلاسٹنگ سے پیدا ہونے والا خلل، شور، دھول، vibration، سڑکوں پر بھیڑ اور زیادہ ٹریفک کی وجہ سے حادثات کا خطرہ
- ◀ بلاسٹنگ سے عمارات کو نقصان اور دھماکے، ٹرلنگ اور batching plant کی وجہ سے شور
- ◀ موجودہ ثقافتی اور سماجی طور طریقوں میں ردوبدل
- ◀ موجودہ سہولیات پر کام کرنے کے لئے علاقے میں آنے والوں کا بوجھ
- ◀ دریا سے ریت اور پتھر حاصل کرنے میں ممکنہ مشکلات
- ◀ گرد سے آلودگی
- ◀ دریا میں پانی کم ہونے سے قدرتی نظارے میں تبدیلی
- ◀ گھروں کی منتقلی سے معاشی اور سماجی نظام پر اثرات

حیاتیاتی اثرات کی فہرست

- ◀ ڈیم کے بعد دریا میں پانی کی مقدار میں کمی
- ◀ پانی میں موجود ریت میں کمی
- ◀ دریا کی شکل اور راستے میں ممکنہ تبدیلی
- ◀ دریا میں مچھلیوں پر منفی اثرات
- ◀ پانی کے قدرتی ماحول اور آبی حیات کو نقصان
- ◀ خطرے سے دو چار (Endangered) حیات اور دور سے آنے والے آبی پرندوں پر اثرات

HBP آبی حیات پر ممکنہ اثرات کے تجزیے کے لئے DRIFT طریقہ اپنائے گا۔ جس میں بین

الاقوامی ماہرین کی ٹیم تمام ممکنہ اثرات کا جائزہ لے گی۔ اور یہ طریقہ کا ہمالیہ کے دریاؤں پر

آزمایا جا چکا ہے۔ اس کا بنیاد مقصد دریا میں پانی کے بہاؤ میں تبدیلی کی وجہ سے آبی حیات

اور دریا سے منسلک لوگوں کی گزر بسر پر ہونے والے اثرات کا جائزہ لینا ہو گا۔ DRIFT کا عمل

شکل نمبر 6 میں دکھایا گیا ہے۔

DRIFT کے چار اہم مقاصد درج ذیل ہیں۔

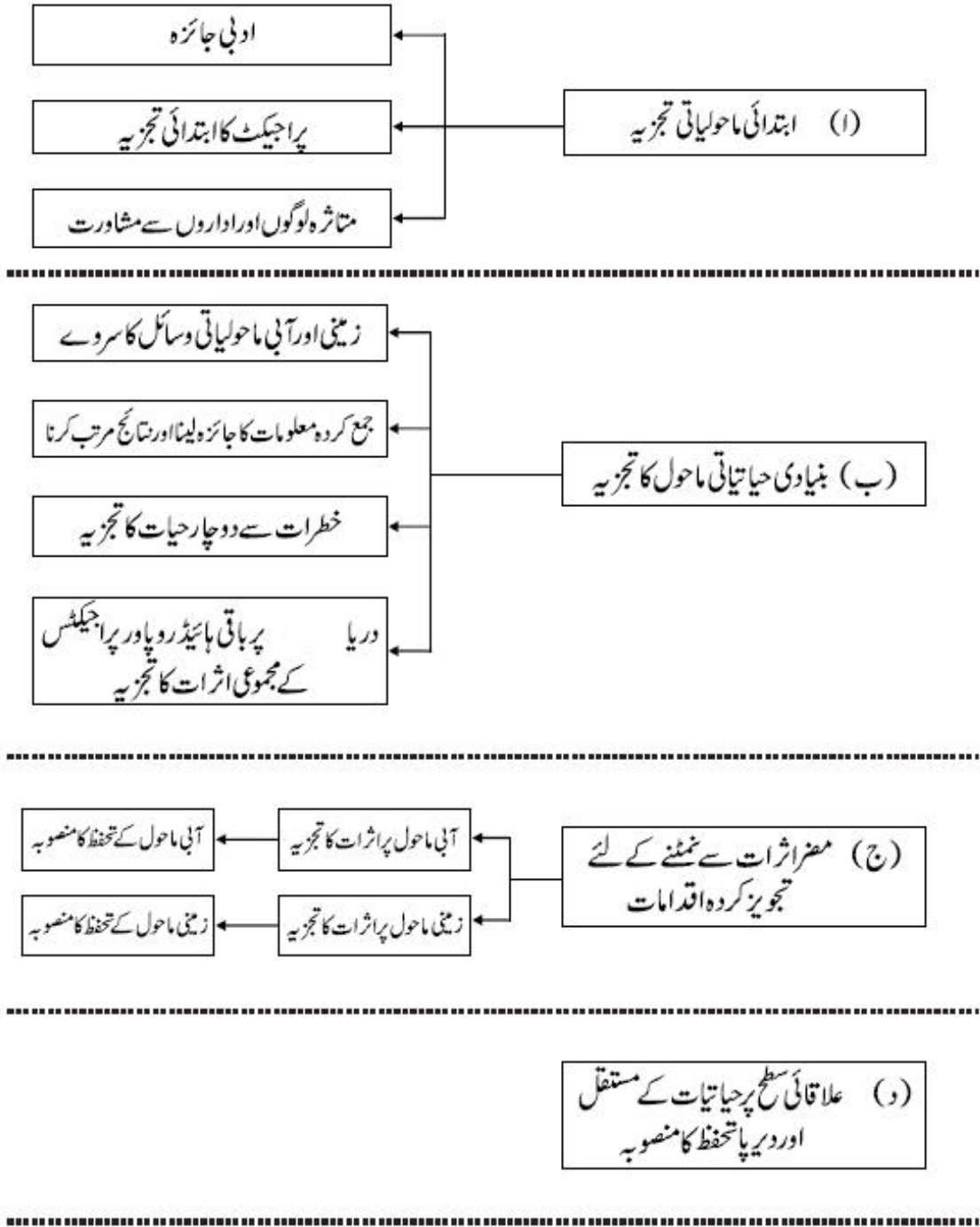
1. دریائی ماحول کی موجودہ معلومات فراہم کرنا
2. دریا کے موجودہ استعمال کی معلومات فراہم کرنا
3. دریا کی تبدیلیوں کے ساتھ دریائی ماحول کی تبدیلی کی پیشن گوئی کرنا
4. دریائی تبدیلیوں سے لوگوں اور معیشت پر اثرات کی پیشن گوئی کرنا

شکل نمبر 4: EIA کا عمل کے ممکنہ اجزاء

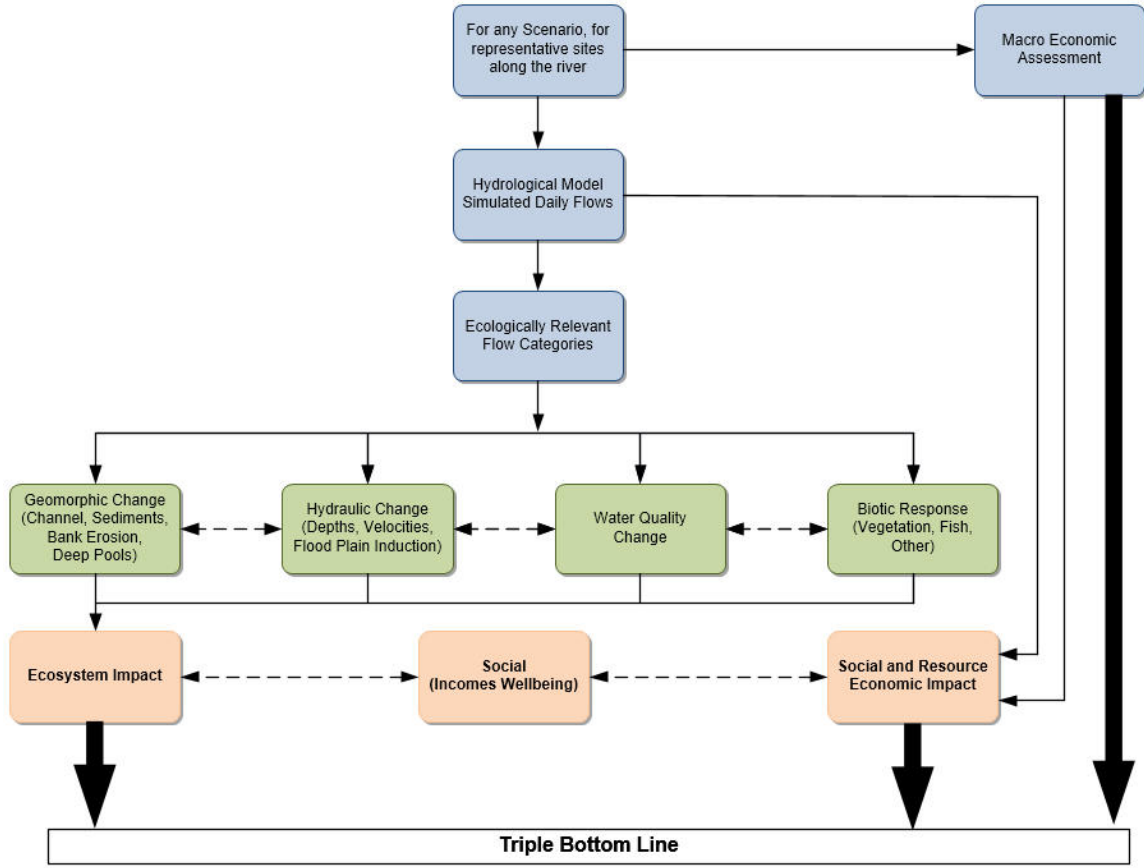
جزو	بنیادی مقصد	اسٹیک ہولڈرز سے مشاورت کی سرگرمیاں
	<ul style="list-style-type: none"> ◀ ان مسائل کا تعین کرنا جن پر EIA میں خصوصی توجہ مرکوز کرنے کی ضرورت ہے ◀ پراجیکٹ کے متبادلات کا تعین جن کا جائزہ EIA کے عمل کے دوران لیا جائے گا۔ 	<ul style="list-style-type: none"> ◀ پراجیکٹ سے متاثر ہونے والے افراد اور اداروں (سٹیک ہولڈرز) کا تعین ◀ سٹیک ہولڈرز سے رابطہ کرنا اور ان کی طرف سے اٹھائے گئے مسائل کا اندراج کرنا ◀ EIA ٹیم کو اس ردعمل سے آگاہ کرنا تا کہ بنیادی تحقیقی سرگرمیوں اور اثرات کے جائزے میں ان آراء کو شامل کیا جا سکے
سرگرمیاں	<ul style="list-style-type: none"> ◀ پراجیکٹ کے ماحولیاتی اور معاشرتی محل وقوع سے متعلق پس منظری معلومات کی جمع آوری 	<ul style="list-style-type: none"> ◀ بنیادی سروے کے دوران سامنے آنے والے مسائل کو شامل کیا جائے
مطالعات	<ul style="list-style-type: none"> ◀ پراجیکٹ کے ممکنہ اثرات کا تعین جو کہ سٹیک ہولڈرز نے مشاورت کے دوران اٹھائے ◀ ممکنہ اثرات کی اہمیت کا تعین اور اثرات سے حل کے لیے اقدامات کی شناخت ◀ انتظامیہ کے ساتھ یا انتظامیہ کے بغیر ممکنہ اثرات کی اہمیت کا تعین کرنا ◀ پراجیکٹ کے (ماحولیاتی اور معاشرتی لحاظ سے) مجموعی طور پر قابل قبول ہونے کا جائزہ لینا 	<ul style="list-style-type: none"> ◀ سٹیک ہولڈرز کی طرف سے سامنے لائے گئے مسائل کا جائزہ
اثرات کو کم کرنے کے اقدامات اور ان کی منصوبہ بندی	<ul style="list-style-type: none"> ◀ اثرات کے جائزے کے دوران ان کو کم کرنے کے اقدامات کا تعین اور ان پر عمل درآمد کو یقینی بنانے کے لیے مجوزہ اقدامات کی تفصیل ماحولیاتی اثرات سے نمٹنے اور ان کی نگرانی کے منصوبے میں دی جائے گی اور پلانٹ کو ایشیا ٹی ترقیاتی بینک کے SPS 2009 اور قومی قوانین و ضوابط کے مطابق لا نا۔ مثال کے طور پر اس میں مخصوص ڈیزائنز اور منصوبے، تربیتی تقاضے، ذرائع کی فراہمی کے تقاضے، نگرانی کی تفصیلات (محل وقوع کی نمونہ بندی، طریقہ کار اور تعدد وغیرہ)، جائزے اور رپورٹس کے تقاضے اور بجٹ 	<ul style="list-style-type: none"> ◀ مخصوص طریقہ کار یا تخفیف کے اقدامات پر بحث جو اثرات کے جائزے کے دوران ظاہر ہوتے ہیں

اسٹیک ہولڈرز سے مشاورت کی سرگرمیاں	بنیادی مقصد	جزو
<p>اسٹیک ہولڈرز کو EIA کی طرف سے جواباً بتایا جائے کہ منصوبے کے تجویز کار کس طرح ان کی طرف سے سامنے لانے گئے مسائل کا حل تلاش کریں گے۔</p>	<p>جائزے کے عمل کی تکمیل کے بعد EIA ٹیم اثرات اور تخفیف کے اقدامات کی تفصیلی تشخیص کرے گی۔ اس میں معلومات کی درست تشریح کو یقینی بنانے کے لیے مختلف ماہرین کے ساتھ رابطہ اور EIA کی رپورٹ مرتب کرنا ہے</p>	تیار
<p>ادارہ ماحولیات تحفظ ایک عوامی اجتماع منعقد کرے گا جس میں دیکھا جائے گا کہ اسٹیک ہولڈرز کے کوئی ایسے خدشات تو باقی نہیں رہ گئے جن کو فیصلہ لینے سے پہلے نہ پرکھا گیا ہو</p>	<p>EIA رپورٹ کا انتظامی اداروں، اور دیگر دلچسپی رکھنے والے افراد یا اداروں کو پیش کیا جانا۔ جائزہ لینے والے افراد اور ادارے بتائیں گے کہ ماحولیات اور معاشرتی لحاظ سے پراجیکٹ کے قابل قبول ہونے سے متعلق ان کا فیصلہ کیا ہے اور منظوری کن شرائط پر دی جا رہی ہے۔</p>	اداروں کو پیش کیا جانا اور فیصلہ سازی

شکل نمبر 5: حیاتیاتی ماحول پر اثرات کے جائزے کا تفصیلی عمل



شکل نمبر 6: آبی حیات پر اثرات کے تجزیے کے لئے DRIFT ماڈل کا طریقہ کار



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Appendix O:Stakeholder Engagement Plan

See following pages.

**Balakot Hydropower
Development Project**

**Stakeholder Engagement
Plan**

HBP Ref.: R9SE6BPK

FINAL

August 1, 2019

Asian Development Bank

Manila, Philippines

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Exhibit 6.2:	Tentative Schedule	6-2

1. Introduction

The Pakhtunkhwa Energy Development Organization (PEDO) intends to construct a 300 megawatt (MW) run-of-river hydropower plant, Balakot Hydropower Development Project (HDIP) or Balakot Hydropower Project (BAHPP) with related infrastructure at Balakot, Mansehra district of Khyber Pakhtunkhwa (KP), Pakistan (**Exhibit 1.1**). The Project is located on the Kunhar River about 17 km upstream of the town of Balakot. The Project has been planned to add low cost electricity to the national grid. The Project will help in meeting the current shortfall and in increasing demand of electricity in the region through economical and sustainable means.

The Asian Development Bank (ADB) intends to provide financing for the Project under its Hydropower Investment Development Program. A Feasibility Study of the Project¹ (FS) was released in October 2013, which included an environmental and social impact assessment section. The ADB has contracted the services of Hagler Bailly Pakistan (Pvt.) Ltd. (HBP) to carry out an EIA of the Project which meets the standards and guidelines prescribed by ADB, and conforms to environmental legislation of KP.

This document describes the Stakeholder Engagement Plan (SEP) for the Project, and also covers stakeholder engagement relevant to the EIA. The purpose of the SEP is to define a technically sound and culturally appropriate approach to engage stakeholders at the early stage of the planned developments. The SEP is designed to ensure:

- ▶ adequate and timely information is provided to stakeholders, and
- ▶ stakeholders have sufficient opportunity to voice their opinions and concerns.

¹ Mirza Associates Engineering Services (Pvt.) Ltd. (Lead Consultant), December 2013, Feasibility Study of Balakot Hydropower Project, Volume I Main Report for Pakhtunkhwa Hydel Development Organization

Exhibit 1.1: Project Location



Stakeholder engagement will act as a bridge between proposed development proponents (PEDO) and key stakeholders (government and regulatory authorities, affected communities, business owners and developers in the area).

Stakeholder engagement will be an ongoing exercise that will start with commencement of fieldwork associated with the feasibility study and EIA study. The SEP will be a dynamic document and will be updated as more information on proposed developments becomes available or additional stakeholders are identified.

Initially, the SEP will be used for the involvement of known stakeholders during the EIA; however, it is the intention that this document will be developed further by PEDO, to include some of the wider aspects of stakeholder engagement going forward including involvement of stakeholders in monitoring the impacts of the Development should decisions to proceed be favorable.

1.1 Objectives of Stakeholder Engagement Plan

The objectives of EIA stakeholder engagement are to:

- ▶ inform stakeholders of the future developments and their consequences;
- ▶ aid in identification of key impacts associated with the development;
- ▶ seek input from key stakeholders on planned activities to increase its positive outcomes and avoid or mitigate negative impacts;
- ▶ involve stakeholders in decision-making of the EIA and development activities;
- ▶ identify appropriate grievance mechanisms; and
- ▶ determine how stakeholders can be involved in the monitoring of environmental and social impacts of the Project should it proceed.

1.2 Regulatory Controls and Good Practice Guidelines

This section describes the applicable national regulation and standards that the stakeholder engagement will comply with, and good practice guidelines by the International Finance Corporation (IFC) and Asian Development Bank (ADB) that will be kept in view.

1.2.1 Applicable National Regulation

The national environmental laws require that only one round of consultations be conducted during the scoping phase of the Project. However, the ADB requires two rounds of consultations during the entire EIA process, during the scoping phase and a feedback consultation before finalization of the Project's environmental design.

Pakistan Environmental Law

The Review of the Initial Environmental Examination and Environmental Impact Assessment Regulations 2000 (IEE-EIA Regulations) provide the necessary details on the preparation, submission, and review of IEE and EIA in Pakistan. Under Regulation 6 of the IEE-EIA Regulations, a set of guidelines have been issued for general applicability and sectoral guidelines produced indicating specific assessment requirements. This

includes the Guidelines for Public Consultation, 1997 (the ‘Guidelines’) summarized below:

- ▶ *Objectives of Public Involvement:* To inform stakeholders about the proposed Project, to provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision making, creating a sense of ownership with the stakeholders.
- ▶ *Stakeholders:* ‘people who may be directly or indirectly affected by a proposal will clearly be the focus of public involvement. Those who are directly affected may be Project beneficiaries, those likely to be adversely affected, or other stakeholders. The identification of those indirectly affected is more difficult, and to some extent it will be a subjective judgment. For this reason it is good practice to have a very wide definition of who should be involved and to include any person or group who thinks that they have an interest. Sometimes it may be necessary to consult with a representative from a particular interest group. In such cases the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of a proposal, but should also include those who can affect the outcome of a proposal.

The range of stakeholders typically includes local people, other affected communities, proponents, government agencies and local councils, Non-Governmental Organizations (NGOs) and other influential people.

- ▶ *Mechanism:* provide sufficient relevant information in a form that is easily understood by non-experts (without being simplistic or insulting); allow sufficient time for stakeholders to read, discuss, consider the information and its implications and to present their views; responses should be provided to issues and problems raised or comments made by stakeholders; selection of venues and timings of events should encourage maximum attendance.
- ▶ *Timing and Frequency:* planning for the public consultation program needs to begin at a very early stage; ideally it should commence at the screening stage of the proposal and continue throughout the EIA process.
- ▶ *Consultation Tools:* some specific consultation tools that can be used for conducting consultations include focus group meetings, needs assessment, semi-structured interviews; village meetings and workshops.
- ▶ *Important Considerations:* The development of a public involvement program would typically involve consideration of the following issues; objectives of the proposal and the study; identification of stakeholders; identification of appropriate techniques to consult with the stakeholders; identification of approaches to ensure feedback to involved stakeholders; and mechanisms to ensure stakeholders’ consideration are taken into account.

1.2.2 Asian Development Bank Guidelines

Public consultation is part of the ADB’s governance policy, sector policies such as forestry and fisheries, and safeguard policies on environment, involuntary resettlement,

and indigenous peoples. It is necessary to ascertain the public's views and provides for people's participation in project design and development is a way to improve environmental governance by providing a mechanism to influence decisions about the use and management of natural resources.

ADB's safeguard policies on Environment, Involuntary Resettlement, Indigenous Peoples recognize the importance of consulting with the project affected individuals and groups to provide opportunities to raise community's concerns and issues.

The public consultation process is guided by the following principles:

- ▶ *Information dissemination:* Sufficient information should be provided in accessible and culturally appropriate ways. Providing information about benefits and disadvantages of the project at an early stage of the EA process allows people time to think about the issues, consider implications, and formulate their views. An informed public will understand the trade-offs; be able to contribute meaningfully to project design; and have greater trust with the project proponent.
- ▶ *Information solicitation:* Asking and listening to the local community, residents, and interested groups about their views and input into the EA yield new insights and site-specific information. Past broken promises or mismanagement may have left a legacy of mistrust. Information solicitation provides public's past experience with authorities and can initiate constructive dialogue.
- ▶ *Integration:* Predicting likely direct and indirect impacts, short-and long-term resource use implications, evaluating their significance and risks, and developing appropriate mitigation and monitoring programs require not only the scientific data collected by sampling and modeling, but must be based on stakeholder's input and views.
- ▶ *Coordination:* The ability to conduct effective public consultation depends on how individual team members appreciate benefits of consultation, understand their roles, and cooperate each other. A well-integrated Project Team with well-defined roles and responsibility can facilitate dialogue with the executive agency to inform the ADB's requirements and gain its commitment to remove any constraints to carry out public consultation throughout the project cycle.
- ▶ *Engaging people in dialogue:* Public consultation involves engaging people in dialogue – a two-way flow of information and ideas between the project proponent and the stakeholders with the opportunity for the stakeholders to express their views and concerns. Ensuring the opportunity to participate in dialogue during the early preparation stage of the EA process enables to manage expectations and detect any potential serious conflict and help resolve issues before they lead to conflict, reducing financial losses due to delays.

For category A Projects public consultation needs to be carried out during the early stage of EA preparation and throughout the project implementation to address any environmental issues that affect the local communities, NGOs, governments, and other interested parties. The Environment Policy requires public consultation at least twice: once during the early stages of EIA field work and once when the draft EIA report is available, and prior to loan appraisal by ADB.

Public consultation can be applied at various times throughout the EA process in order to build consultation into project planning and implementation, and to monitor consultation activities throughout the project cycle. While there is no formula for determining when public consultation should be applied, it generally should start early in an EA process.

1.2.3 Good Practice Principles

The consultations will be undertaken in good faith, while remaining impartial. The good practice principles which will be observed during the consultations are as follows:²

- ▶ *Cultural sensitivity* – this requires respect, understanding and appreciation for the customs, institutions, values, and norms of the communities affected by a project.
- ▶ *Interactive approach* – stakeholder engagement should not be limited to the one-way dissemination of information by the project proponent but should include stakeholder input into decision making processes for the proposed Project.
- ▶ *Open, transparent and informative* – Project stakeholders should have access to relevant information, in a simple and understandable format.
- ▶ *Inclusive and equitable* – ensure all stakeholder groups are represented, including less represented groups such as women, children, elderly and the poor.
- ▶ *Appropriateness and flexibility* – stakeholder engagement techniques (surveys, interviews, workshops etc.) must be appropriate to the specific phase of the ESIA study (scoping consultations, feedback consultations) and the stakeholder groups identified.
- ▶ *Capacity building* – capacity building should be a part of interaction with stakeholders, wherever appropriate and practicable.

1.3 Development of SEP

It is expected that in the long term the SEP will provide the basis for strengthening the planning process of PEDO in general and will become a platform through which the PEDO can:

- ▶ identify and address the concerns, suggestions and interests of the stakeholders in the planning, design and implementation of the Project;
- ▶ collect vital information to assess the cumulative impacts of the Project;
- ▶ identify appropriate management measures;
- ▶ coordinate decisions with other regulatory authorities and institutional stakeholders on whether to approve the future developments and corresponding conditions of approval;
- ▶ provide a means of receiving any grievances of the public in a timely manner and addressing them to the satisfaction of the community; and

² These good practice principles are drawn from WBG Stakeholder Engagement Good Practice Handbook.

- ▶ involve stakeholders in monitoring the impacts of the current and future developments.

In summary, the SEP will be updated and designed to integrate the stakeholder engagement into the core business activities of PEDO. It is envisaged the SEP will help in developing a broad, inclusive, and continuous communication path between PEDO and its stakeholders.

This plan will be updated at the completion of the EIA study to provide a coordinated strategy for ongoing consultations by PEDO.

2. Engagement Activities and Steps

The stakeholders for the Project will be involved and consulted, during the course of the EIA study and various phases of the Project development activities, in compliance with the standards and guidelines provided above. The key steps to be followed for the proposed Project's stakeholder engagement are provided in **Exhibit 2.1**. Additional details are provided in **Section 4** and **5**.

Given previous consultations as part of the 2013 ESIA, verification consultations will be carried out for the EIA. These will include:

- ▶ Community consultations in least 30% of river dependent communities within the Socioeconomic Study Area, along with the socioeconomic surveys.
- ▶ Community consultations within 100% of communities within a 500 m buffer of Project facilities.
- ▶ River dependent businesses (including sand mining, fishing, and recreation) covered along with the socioeconomic surveys.
- ▶ All concerned institutional stakeholders, including government departments and NGOs will be consulted.

Exhibit 2.1: Summary of Stakeholder Engagement Activities and Steps

<i>Steps</i>	<i>Description</i>
Stakeholder identification and analysis	<ul style="list-style-type: none"> ▶ Identification of government bodies, regulatory agencies, non-governmental organizations, other investors and communities which are associated with or have a stake in the Project, or, in general, in development of hydropower projects in the area. ▶ Analysis of how the identified stakeholders will be affected by or can affect the Project. ▶ Over the course of the EIA, and following completion of the EIA, this will remain an on-going task. <p>See Annexure A.</p>
Information disclosure	<ul style="list-style-type: none"> ▶ A background information document (BID) in English and Urdu will be prepared keeping in mind the linguistic limitations of local communities. The document will be shared with the identified stakeholders providing them information about the Project, the purpose of engaging them and key issues within the area. The BID will be updated, as required, throughout the duration of the EIA. ▶ Following completion of the EIA, an updated BID will be kept by PEDO for any additional stakeholders that request information about the Project. <p>See Annexure B.</p>
Stakeholder consultation	<ul style="list-style-type: none"> ▶ Stakeholders will be informed prior to the consultations. The time and venue for the consultations will be shared and agreed with the stakeholders.

<i>Steps</i>	<i>Description</i>
	<ul style="list-style-type: none"> ▶ Consultations with the communities will be held within the settlements, to the extent possible. Where, due to logistic or security concerns, it is not possible to hold consultations with the community, a nearby community or location will be selected, to facilitate maximum participation. Separate consultations with the female members of the community will be held. ▶ The consultations will be targeted and meaningful i.e. directly related to the proposed Project, while also aiming to distinguish between impacts of development activities of the Project and other nearby developments. ▶ The proceedings of the consultation meetings will be recorded.
Reporting to Stakeholders	<ul style="list-style-type: none"> ▶ Feedback consultations will be held to inform the stakeholders about the results of the EIA study and the recommendations for actions to address their concerns and to manage the impacts associated with the proposed developments. ▶ Following feedback consultations for the EIA, this will remain an on-going task by PEDO.
Ongoing Engagement	<ul style="list-style-type: none"> ▶ PEDO will continue engagement and grievance redress throughout the life of the Project.

3. Proposed Structure for Stakeholder Engagement and Grievance Redressal

In this section the proposed structure for stakeholder engagement within PEDO is proposed. This will be discussed with PEDO to further develop and finalize.

It is proposed that PEDO sets it as policy to effectively engage stakeholders during the entire life of the Project. In this regard, it shall constitute the following entities:

- ▶ **Public Coordination Unit (PCU)**, which will be responsible to proactively engage stakeholders during the course of the Project development and possible operation, proactively inform stakeholders on developments and changes, and receive suggestions/complaints, maintain logs and resolve complaints.
- ▶ **Stakeholder Engagement Committee (SEC)**, responsible to oversee the functioning of the PCU as well as the final non-judicial authority on resolving grievances that cannot be resolved by PCU.
- ▶ **Coordination Focal Points (CFPs)**, which will be educated people from each community that can be approached by the PCU to help in engagement and disseminate information, and can be approached by the community members to assist in providing feedback, and communicating their grievances to the Project. The CFPs will be provided training by the Project in facilitating grievance redress.

3.1 Function and Structure of Public Coordination Unit

The structure of the SEC and PCU is described below.

The PCU will be set up as part of the PEDO Project Team. A Community Relations Officer (CRO) of PEDO will lead the unit. During the project development and construction period it is proposed at least two Community Liaison Officers (CLOs), one male and one female, will be responsible for coordinating correspondence and assisting the (CRO). The CLOs will be responsible for preparation of documentation including complaint/suggestion/request for information logs and providing community feedback on the company's response to the communities' issues.

Given the female community members may have restricted mobility outside of their villages and homes, the female CLO will be required to undertake visits to the local communities. The frequency of visits will depend on the nature and magnitude of activity in an area and the frequency of grievances.

Initially, PEDO may wish to hire a single CLO to represent PEDO and report directly to senior PEDO management. During this period CLOs will not enter negotiations or make commitments on behalf of PEDO, and the senior PEDO management will carry out all other functions described below.

3.2 Function and Structure of the Stakeholder Engagement Committee

The SEC will function as an independent body that will regulate the PCU and the grievance redress process. It will comprise:

- ▶ Environmental and social team of PEDO;
- ▶ PEDO's senior management responsible for overseeing contractors;
- ▶ Two, or more, representatives from the communities residing near the Project location; and
- ▶ A representative of the local government (if required).

The SEC will meet once every three months to review the performance of the PCU; the frequency can be changed depending on the nature and frequency of issues received. The performance will be gauged in terms of the effectiveness and the timeliness with which community issues are managed. In case there are any unresolved or pending issues, the SEC will deliberate on mechanisms to resolve those and come up with solutions acceptable to everyone.

3.3 Coordination Focal Points

The coordination focal points (CFPs) will be literate people from each community that will facilitate their community members in reporting grievances to the Project. The CFPs will be provided training by the Project in facilitating grievance redress. Each community will have a male and female CFP appointed for this purpose. However, the CFPs will not be the only community members that can register a grievance; and this facility will be available to every individual in the communities.

3.4 Advisory Support to PEDO

Stakeholder identification will be carried out as part of the EIA process. Stakeholders likely to be affected by the Project have been identified through an understanding of the potential impacts that may arise from the development activities of the Project and through:

- ▶ review of existing published environmental and other studies conducted in the area; experience gained by HBP during previous ESIA studies conducted in the area; and
- ▶ satellite imagery for identification of settlements within the Study Area and the wider area.

3.5 Framework for On-going Engagement and Grievance Redress by PEDO

On-going engagement will be carried out by PEDO in the construction phase and throughout the life of the Project. The stakeholder engagement is expected to include:

- ▶ reporting on the implementation of any management plans;
- ▶ opportunities for stakeholders to respond to the information received; and
- ▶ constructive dialogue on environmental and social issues and performance.

The stakeholder engagement process will be documented, including:

- ▶ maintenance of a stakeholder database with stakeholder details;
- ▶ records of information disclosed to stakeholders;
- ▶ records of stakeholder engagements;
- ▶ records of inputs from stakeholders and responses to these; and
- ▶ grievance redress records and documentation.

Grievance Redress Mechanism Framework

The redress of stakeholder grievances through mechanisms that provide an effective avenue for expressing and achieving resolution of stakeholder concerns is critical for the maintenance of good relations between the project proponent and stakeholders and for avoidance of potential sources of tension and conflict. In this context, the SEP will help in forming and strengthening relationships between PEDO management and the stakeholder groups, and in bridging any gaps to provide PEDO management a ‘social license’ to operate in the area.

A framework mechanism to handle grievances and complaints from stakeholders is provided below and will be subsequently updated during various phases of the Project development and operation. The purpose of the complaints procedure will be to ensure that complaints from project affected communities and representatives of their interests are dealt with appropriately, with corrective actions being implemented where needed and the complainants being informed of the outcome. The SEP will aim to ensure grievances are treated without prejudice.

Step 1: Receive and Acknowledge Complaint

Once the PCU receives a complaint, which could be the complainant giving it in person, via letter or email, through a phone call, or through a CFP, an acknowledgement of receipt of the complaint will be sent within two working days to the complainant. The complainant will be issued a unique complaint tracking number for their and PCU’s record.

Step 2: Investigation

The PCU will work to understand the cause of the grievance for which it may need to contact the complainant again for details. The PCU will be required to complete preliminary investigations within five working days of receiving the complaint and send a response to the complainant documenting the results of investigations and what the PCU plans to do in response.

Step 3: Resolution through PCU

Once the PCU has investigated a grievance, it will share with the complainant the proposed course of action to resolve the complaint. If the complainant considers the grievance to be satisfactorily resolved, the PCU will log the complaint as resolved in its record.

For minor or less complex grievances, Steps 1, 2 and 3 or Steps 2 and 3 can be merged.

Step 4: Resolution through SEC

In case the PCU is unable to resolve the grievance, the matter will be referred to the SEC. Complaints that cannot be resolved within four weeks of filing will by default be referred to SEC. However, the complainant or the PCU can convene the SEC at any point in time, depending on the nature and urgency of the issue.

Operating Principles for PCU

The PCU will operate on the principles of transparency, approachability and accountability. To achieve these, the PCU will be required to:

- ▶ be equipped to handle grievances in the local languages;
- ▶ be equipped to work through multiple modes of communication, such as, emails, by-post and face-to-face meetings at plant site or requiring visits;
- ▶ employ female staff, preferably from the nearby communities, to oversee complaints and issues of the female community members;
- ▶ maintain a log of grievances, with record of the date and time of the complaint logged and stakeholder information, such as, name, designation and contact details;
- ▶ provide opportunity to the stakeholder to revert with their comments on the proposed plan of action;
- ▶ keep the stakeholder informed of the progress in grievance resolution;
- ▶ obtain stakeholder consent on the mechanism proposed to redress the grievance and document consent; and
- ▶ maintain confidentiality of the stakeholder, if requested so.

Stages of Grievances

Once a grievance is logged with the PCU, it could reach the following stages:

Stage 1: It is resolved by the PCU or if not PCU, by the SEC.

Stage 2: If the SEC cannot resolve the issue, it will inform PEDO's senior management accordingly and senior management will organize a special mission to address the problem and identify a solution.

Stage 3: If the stakeholders are still not satisfied with the reply in Stage 3, they may go through local judicial proceedings.

Stakeholder Awareness

The stakeholders will be informed of the establishment of the PCU and grievance redress mechanism through a short and intensive awareness campaign. PEDO will share the following with the stakeholders as a part of the awareness campaign:

- ▶ objective, function and the responsibilities of the PCU;
- ▶ means of accessing the PCU and the mechanics of registering a grievance at the PCU;
- ▶ operating principles of the PCU; and
- ▶ contact details.

Additional awareness campaigns may be organized, if necessary.

4. Stakeholder Identification and Analysis

Initial stakeholder identification has been carried out as part of the EIA process. The initial list developed as part of the EIA will be further updated throughout the duration of the EIA by HBP, and by PEDO as part of ongoing engagement after completion of the EIA. Stakeholders likely to be affected by the Project have been identified initially through an understanding of the potential impacts that may arise from the development activities of the Project and through:

- ▶ review of existing published environmental and other studies conducted in Khyber Pakhtunkhwa (KP);
- ▶ experience gained by HBP during previous ESIA studies conducted in KP and nearby areas; and
- ▶ satellite imagery for identification of settlements within the Study Area and the wider area.

On the basis of the above, the following groups are identified as those which may have an interest in the Project or may be impacted by the Project development activities:

- ▶ Communities within the Socioeconomic Study Area that are likely to be directly impacted by the Project development activities resulting in emissions, dust, noise, vibrations and possible relocation.
- ▶ Key owners and developers of other projects in the vicinity.
- ▶ Business owners within the Study Area, and other suppliers or service providers in the vicinity.
- ▶ Government and regulatory authorities directly or indirectly connected to or overseeing the activities of the Project.
- ▶ Non-governmental organizations that can affect or influence the Project.

Exhibit 4.1 illustrates the Socioeconomic Study Area for the EIA which will be the focus of the community consultations.

4.1 Institutional Stakeholders

The institutional stakeholders have been identified in the following categories:

- ▶ Regulatory Agencies
- ▶ Government Departments
- ▶ Non-governmental Organizations active in the area
- ▶ Hydropower Project Developers in the Kunhar Basin
- ▶ Other Financiers in the Jhelum Basin

The information for representatives in each of the identified stakeholders within each of category is provided in **Exhibit 4.2**, along with the stakeholder's relevance to the Project.

Exhibit 4.1: Socioeconomic Zones in Study Area

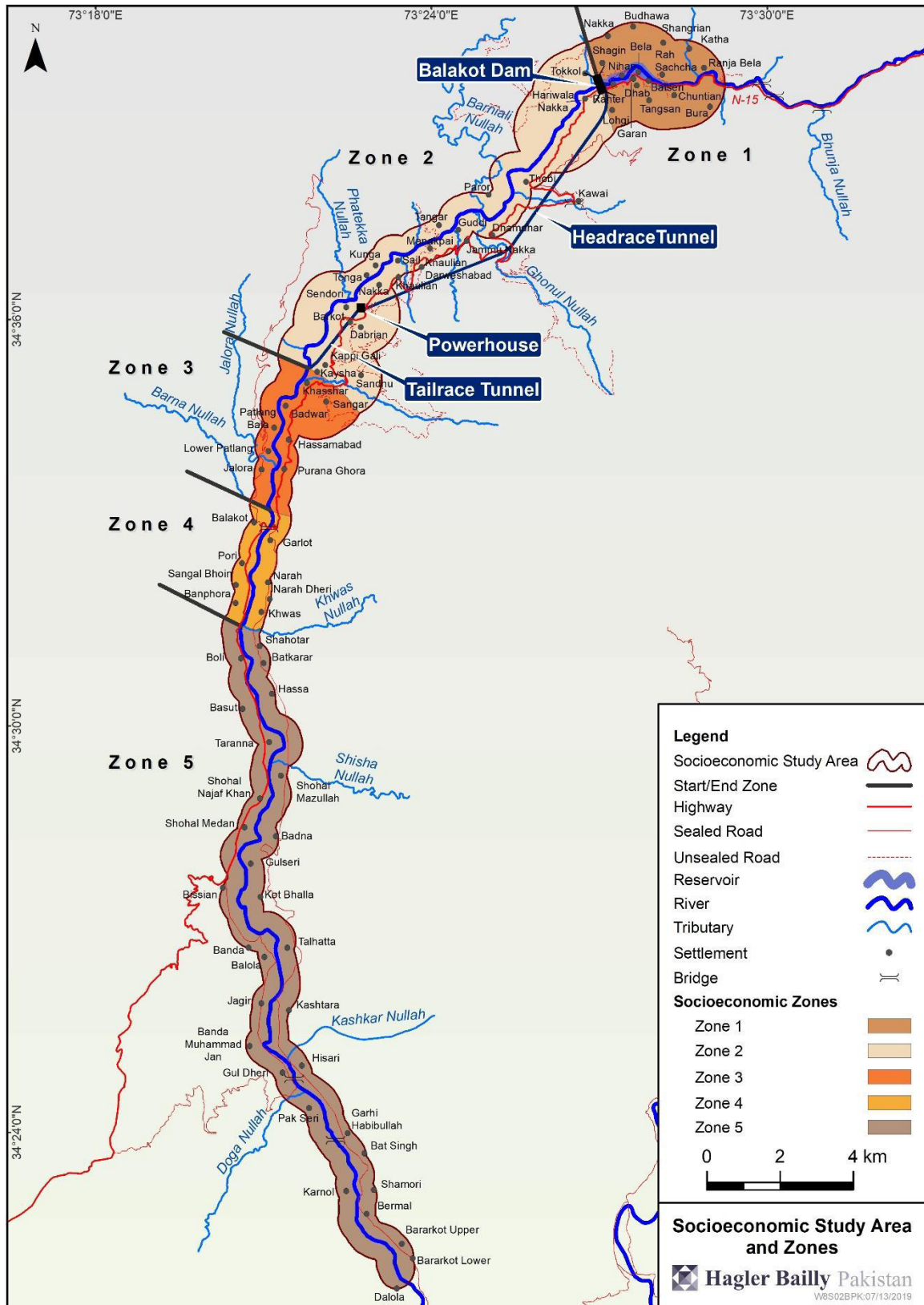


Exhibit 4.2: Identified Stakeholders and their Relevance

<i>Stakeholder/Groups</i>	<i>Name</i>	<i>Position</i>	<i>Relevance to the Project</i>
Regulatory Agencies			
Environmental Protection Agency, KP	<i>Dr. Mohammad Bashir Khan</i>	<i>Director General</i>	<i>Authority for approval of the EIA</i>
National Electric Power Regulatory Authority (NEPRA)	<i>Himayat Ullah Khan</i>	<i>Vice Chairman Member Khyber Pakhtunkhwa</i>	<i>Determination of the tariff associated with the Project</i>
Government Departments			
Wildlife Department, KP	<i>Syed Mubarak Ali Shah</i>	<i>Chief Conservator</i>	<i>Interest in the terrestrial wildlife that can be impacted by the Project and associated regulation.</i>
Fisheries Department, KP	<i>Dr. Sher Mohammad</i>	<i>Director Fisheries</i>	<i>Interest in the fish fauna that can be impacted by the Project and associated regulation.</i>
Fisheries Department, KP	<i>Arshad Aziz</i>	<i>Deputy Director</i>	
Fisheries Department, KP	<i>Mohammad Tanvir</i>	<i>Assistant Director Fisheries, District Mansehra</i>	
Forest Department, KP	<i>Sardar Tamor Ilyas</i>	<i>DFO Mansehra</i>	<i>Interested in the loss of forested area as a result of the Project and compensatory afforestation.</i>
Revenue Department, KPK	<i>Syed Asghar Shah</i>	<i>Tehsildar Balakot</i>	<i>Responsible for the land to be acquired for the Project facilities, in the interest of the public. Also responsible for determination of market price of the acquired land.</i>
Social Welfare Department, KP			<i>Interested in the welfare of the communities in the area, especially those that will be impacted by the Project</i>
Non-Government Organizations			
World Wildlife Foundation (WWF)	<i>Rab Nawaz</i>	<i>Country Head - Biodiversity</i>	<i>Interested in the wildlife and wildlife habitat that can be impacted by the Project, both terrestrial and aquatic.</i>

<i>Stakeholder/Groups</i>	<i>Name</i>	<i>Position</i>	<i>Relevance to the Project</i>
Himalayan Wildlife Foundation (HWF)	<i>Dr. Anis-ur-Rahman</i>	<i>Director</i>	<i>Interested in the himalayan wildlife and its habitat that can be impacted by the Project, both terrestrial and aquatic.</i>
Sarhad Rural Support Program			<i>Interested in the impact of the Project on rural communities and support for rural communities in the area.</i>
Aga Khan Rural Development Program			<i>Interested in the impact of the Project on rural development in the community.</i>
HPP Developers			
Patrind HPP	<i>Waqar Ahmad Khan</i>	<i>Chief Executive Officer</i>	<i>Interested in the basin-level impacts of the Project and the downstream effects, especially those associated with Project design.</i>
Sukki Kinari HPP	<i>Muhammad Jamil Dogar</i>	<i>Project Director</i>	<i>Interested in the basin-level impacts of the Project, especially those associated with Project design.</i>
Other Financiers in the Jhelum Basin			
International Finance Corporation (IFC)	<i>Shahid Lutfi</i>	<i>Environment Specialist</i>	<i>Interested in the development of HPPs in the Jhelum-Poonch Basin, especially the Project's contribution to cumulative impacts.</i>

5. Consultation Approach and Mechanism

This section describes the stakeholder consultation approach and mechanism.

Consultations will focus on identifying key environmental and social impacts associated with the Project development activities. The recorded concerns of the stakeholders will be addressed in the EIA through proposing appropriate management measures.

Project stakeholders will be informed about the Project development activities through the dissemination of a BID. The document will be shared with institutional stakeholders prior to the consultation, while the document will be shared with the communities during consultation visit. The BID will be prepared in English and Urdu to match the language requirements of the consulted stakeholders. The BID is attached as **Annexure B**. The BID will be updated after finalization of the Project design, and on as needed basis thereafter by PEDO.

The consultation mechanism to engage industrial, institutional and community stakeholders has been provided below. Consultations will be carried out in four different phases during the EIA as described below:

<p>Initial Engagement and Scoping Consultations with Community within the Socioeconomic Study Area</p>	<p>The HBP consultation team, comprising of both male and female consultation specialists will visit communities within the Socioeconomic Study Area for initial engagement and scoping consultations. Separate consultations will be conducted with male and female members of the communities in recognition of the cultural gender sensitivities within Pakistan.</p> <p>The consultations will focus on communicating the Project development activities to be carried out. A Background Information Document (BID) will be shared with the communities providing them the most up to date information on the key Project development activities and location of the Project facilities. In addition to scoping consultations, a needs assessment is included as part of the socioeconomic survey carried out as part of the EIA.</p> <p>The BID will also include the grievance redress mechanism employed by PEDO and contacts in PEDO to register issues (including any grievances). Updated BIDs will be shared with communities on the basis of the final design of the Project. The BID is attached as Annexure B.</p>
<p>Additional On-Going Consultations with Community within the Socioeconomic Study Area and Outside it</p>	<p>Depending on the outcomes of the initial engagement and scoping consultations, additional consultations will be carried out with communities within the Study Area. Scoping consultations will also be carried out with additional communities identified as important (see Annexure B).</p> <p>Following finalization of the Project layout, updated BIDs will be shared with relevant communities in the Study Area.</p> <p>In order to ensure maximum participation, field staff will visit or call the communities in advance to inform the residents about the upcoming consultations.</p>

<p>Institutional Consultations</p>	<p>Institutional consultations will be carried out with key institutions identified, as high or medium priority on the basis of stakeholder analysis, with respect to the EIA (see Annexure A).</p> <p>The provision of background information to key institutional stakeholders (see Annexure A) will be undertaken in advance of the consultations through visits, letters, emails or telephone. During the consultations, HBP's consultation team will present information related to Project development and the stakeholder engagement process, and respond to and record any comments and queries from the participants. Wherever possible, combined consultations will be held with institutional stakeholders through representative organizations such that the stakeholders can hear the concerns expressed by others and responses provided if any and make the consultation more interactive.</p>
<p>Feedback Consultations</p>	<p>Feedback Consultations will have a broad spatial coverage. Communities within the Socioeconomic Study Area and institutional stakeholders will be provided feedback during this phase of consultations. Posters and presentations will be utilized as visual aids for these consultations.</p> <p>Feedback Consultations will focus on communicating the outcome of the EIA process and specifically highlight the expected impacts and proposed management measures. It will aim to address the concerns of stakeholders raised during previous consultations. Feedback consultations will help in confirming the acceptableness and likely effectiveness of the proposed management measures.</p> <p>This feedback consultation will progress in the following manner:</p> <p>Participants will be provided an overview of the process adopted for the EIA study and its key outcomes.</p> <p>Participants will be provided an overview of key issues raised by them and how these have been addressed in the EIA.</p> <p>The consultation team will answer any queries and record any additional concerns.</p> <p>A non-technical summary of the EIA (in English) will be provided to institutional stakeholders.</p>

The HBP consultation team will keep a record of the discussions during the consultation meetings. HBP will report the meeting minutes in the form of a table logging the stakeholder issues with names of stakeholders and dates of consultations. A template of the consultation log is provided as **Annexure C** of this document.

6. Consultation Schedule

The tentative schedule for the community consultations is provided in **Exhibit 6.1**.

Exhibit 6.1: Tentative Schedule

<i>Consultation Phase</i>	<i>Who</i>	<i>Planned</i>
Initial Engagement and Issues Scoping Consultations	Communities inside and outside the 500 m buffer	March 20, 2017 onwards
Additional Ad-Hoc Consultations	As required	On-going following initial engagement and scoping consultations
Institutional and Business Consultations	Developers of other projects, mainly hydropower projects Local businesses in Study Area that may be affected	March 31, 2017 onwards
Feedback Consultations	Concerned stakeholders	After completion of draft EIA
Grievance Redress	All stakeholders	On-going by PEDO
On-going consultations	As required	Following EIA completion by PEDO

The tentative schedule for institutional consultations is provided in **Exhibit 6.2**, organized by location. In some cases information is missing. These stakeholders will be located once in the field.

Exhibit 6.2: Tentative Schedule

<i>Location</i>	<i>Name</i>	<i>Representative</i>	<i>Position</i>	<i>Tentative Date of Consultation</i>
Islamabad				
1.	<i>National Electric Power Regulatory Authority (NEPRA)</i>	<i>Himayat Ullah Khan</i>	Vice Chairman/Member Khyber Pakhtunkhwa	Between March 31 and April 07, 2017
2.	<i>World Wildlife Foundation (WWF)</i>	<i>Rab Nawaz</i>	Country Head - Biodiversity	
3.	<i>Himalayan Wildlife Foundation (HWF)</i>	<i>Dr. Anis-ur-Rahman</i>	Director	
4.	<i>Patrind HPP</i>	<i>Waqar Ahmad Khan</i>	Chief Executive Officer	
Peshawar				
1.	<i>Environmental Protection Agency, KP</i>	<i>Dr. Mohammad Bashir Khan</i>	Director General	Between April 10 and April 14, 2017
2.	<i>Wildlife Department, KP</i>	<i>Syed Mubarak Ali Shah</i>	Chief Conservator	
3.	<i>Fisheries Department, KP</i>	<i>Dr. Sher Mohammad</i> <i>Arshad Aziz</i> <i>Mohammad Tanvir</i>	Director Fisheries Deputy Director Assistant Director Fisheries, District Mansehra	
4.	<i>Forest Department, KP</i>	<i>Sardar Tamor Ilyas</i>	DFO Mansehra	
Karachi				
1.	<i>International Finance Corporation (IFC)</i>	<i>Shahid Lutfi</i>	Environment Specialist	Between March 31 and April 07, 2017
Lahore				
1.	<i>Sukki Kinari HPP</i>	<i>Muhammad Jamil Dogar</i>	Project Director	Between March 31 and April 07, 2017
Balakot				
1.	<i>Revenue Department, KP</i>	<i>Syed Asghar Shah</i>	Tehsildar Balakot	Between March 31 and April 07, 2017
2.	<i>Social Welfare Department, KP</i>			

Annexure A: Initial Stakeholder List and Initial Analysis

The following list will be continually updated based on field information.

Exhibit A.1: List of Institutional Stakeholders and their Relevance for the EIA and the Project

<i>Stakeholder Group</i>	<i>Stakeholder</i>	<i>Relevance to EIA³</i>	<i>Relevant to RAP</i>	<i>Relevance to Project Development and Implementation</i>
Regulatory Institutions	Khyber Pakhtunkhwa Environmental Protection Agency (KP EPA)	KP EPA is the regulatory authority that is mandated to protect environment and approve or reject Project EIAs.	KP EPA is a key institution involved in the granting of approval for the communities that are being resettled and the areas being used for resettlement	
Government Institutions	Fisheries Department, KP Wildlife Department, KP Forest Department, KP Revenue Department, KP Agriculture Department, KP Social Welfare Department, KP National Electric Power Regulatory Authority (NEPRA)	The organizations associated with natural resources are important in terms of informing about the important natural resources in the area as well as highlighting the key issues associated with them. The organizations associated with infrastructure are important in terms of Project impacts on their work and relevant infrastructures in the area.	The resettlement may result in the exploitation of natural resources elsewhere, in areas where the communities are resettled.	
Non-Governmental Organizations and Civil Society Organizations	There are a number of NGOs operating in KP. Some of these include (to be verified during the socioeconomic surveys): <ul style="list-style-type: none"> ▶ Sarhad Rural Support Program ▶ Aga Khan Rural Development Program The NGOs working on protection and management of wildlife and natural resources: <ul style="list-style-type: none"> ▶ World Wide Fund for Nature (WWF) 	The NGOs operating in the Study Area have influence within the communities and can appeal decisions of the regulatory authorities. A number of them have carried out development work which may be impacted due to the Project. The NGOs that are actively working in the Study Area will be consulted as part of the EIA consultations.	The NGOs are involved in community development and can work in the areas to which communities are resettled provided there is effective coordination with them regarding the RAP.	Synergy between work being carried out by NGOs and CSR activities by PEDO can be achieved by collaborating with reputable NGOs that are engaged in the Study Area. Examples of active and reputable NGOs are: ACTED Pakistan for technical and vocational training WWF for wildlife management

³ Stakeholders that can appeal decision of delegated authority with relevance to ESIA approvals.

<i>Stakeholder Group</i>	<i>Stakeholder</i>	<i>Relevance to EIA³</i>	<i>Relevant to RAP</i>	<i>Relevance to Project Development and Implementation</i>
	▶ Himalayan Wildlife Foundation (HWF)			
Key Owners and Developers of Other Hydropower Projects	PEDO Star Hydropower (Pvt.) Limited Star Hydro K Water Global	Developers can appeal decisions of regulatory authorities.		The Project can benefit from development experience of other owners and developers by identifying practices that have worked well in local conditions, and by reviewing the lessons learnt. A synergistic approach could be achieved with the inclusion of other key owners and developers in the Project planning.
Business Owners within Study Area	Shopkeepers within the vicinity Businesses that rely on ecosystem services related to the river	Shopkeepers within the vicinity of the Project will be affected due to the Development. Business that rely on ecosystem services related to the river may be affected. Potential service providers that may be affected due to the development.	Certain shopkeepers and local businessmen may have to relocate their businesses.	

<i>Stakeholder Group</i>	<i>Stakeholder</i>	<i>Relevance to EIA³</i>	<i>Relevant to RAP</i>	<i>Relevance to Project Development and Implementation</i>
Communities within a 500 m buffer of the River (being relocated and likely having river-dependent livelihood)	Communities with river-dependent livelihoods and being relocated/resettled	<p>Community stakeholders within the Study Area are priority communities because they have river-dependent livelihoods. They can appeal decisions of regulatory authorities, and may be affected by the Project, more so than institutional stakeholders. They are priority and key stakeholders as they:</p> <ul style="list-style-type: none"> ▶ Will be resettled ▶ May be vulnerable due to their dependence on natural resources that the Project may impact ▶ May be impacted through Project impacts on air, water, noise and traffic and related secondary impacts. 	Relevant to the RAP because they will be relocated (household consultations to be carried out during RAP surveys for resettlement)	Over the course of implementation, the community stakeholders can be considered as partners in development, and can help the owners fulfill their social obligations and responsibilities. They may also have grievances that need to be addressed by the Project owner.
Communities within a 500 m buffer of the River (not relocated but likely having river dependent livelihood)	Communities with river-dependent livelihoods	<p>Community stakeholders within the Study Area are priority communities because they have river-dependent livelihoods. They can appeal decisions of regulatory authorities, and may be affected by the Project, more so than institutional stakeholders. They are priority and key stakeholders as they:</p> <ul style="list-style-type: none"> ▶ May be vulnerable due to their high dependence on natural resources that the Project may impact ▶ Concerned about other impacts that may affect them such as potential impacts on 	Not relevant to the RAP because they will not be relocated.	Over the course of implementation, the community stakeholders can be considered as partners in development, and can help the owners fulfill their social obligations and responsibilities. They may also have grievances that need to be addressed by the Project owner.

<i>Stakeholder Group</i>	<i>Stakeholder</i>	<i>Relevance to EIA³</i>	<i>Relevant to RAP</i>	<i>Relevance to Project Development and Implementation</i>
		air, water, noise and traffic and related secondary impacts.		
Communities within 1 km buffer of Project infrastructure	Communities that may be directly impacted by the Project	These communities may be impacted directly by the Project, particularly during the construction period. Impacts include traffic related incidents, health impacts due to air quality, noise related issues, etc.		Over the course of implementation, the community stakeholders can be considered as partners in development, and can help the owners fulfill their social obligations and responsibilities. They may also have grievances that need to be addressed by the Project owner.

Annexure B:Background Information Document

A background information document (BID) is given below:

Background Information Document Environmental Impact Assessment of the Balakot Hydropower Development Project

Introduction

The Pakhtunkhwa Energy Development Organization (PEDO) intends to construct a 300 megawatt (MW) run-of-river hydropower plant Balakot Hydropower Development Project (HDIP) or Balakot Hydropower Project (BAHPP) with related infrastructure at Balakot, Mansehra district of Khyber Pakhtunkhwa (KP), Pakistan. The Project is located on the Kunhar River. The Project will help in meeting the current shortfall and in increasing demand of electricity in the region through economical and sustainable means.

The Project was identified in 1995 under the study “Identification of Hydropower Potential in Kaghan Valley” by Sarhad Hydel Development Organization (SHYDO) with the technical collaboration of the German Agency for Technical Cooperation (GTZ) as a 190 MW HPP. A Feasibility Study of the Project⁴ (FS) was released in October 2013, which included an environmental and social impact assessment section. However, as the Project is being financed by the Asian Development Bank (ADB), it has contracted the services of Hagler Bailly Pakistan (Pvt.) Ltd. (HBP) to carry out an environmental impact assessment (EIA) of the Project and develop a Land Acquisition and Resettlement Plan (LARP) which meets the standards and guidelines prescribed by ADB, and conforms to environmental legislation of KP.

As part of the EIA process, consultations are undertaken with communities and institutions that may have interest in the Project or may be affected by the Project (the “Stakeholders”) to record their concerns and to address them in the course of project design and preparation of the EIA. The previous EIA effort included consultations with stakeholders. As part of a due diligence, consultations are being carried out with community stakeholders, as well as with institutional stakeholders that would like to be re-consulted, and institutional stakeholders that are important and were not previously consulted.

For informed consultations with stakeholders, this Background Information Document (BID) has been prepared to provide information on the project design, its setting, EIA process, potential impacts that will be the subject of the Study, and the process to be followed for environmental impact assessment.

The BID is subject to changes as further information on some aspects of the Project become available during the course of the EIA.

Project Setting

The Project is located on the Kunhar River in the Khyber Pakhtunkhwa (KP) province of Pakistan, in the 12 km stretch from Paras to Sangar Village. The hydel power potential

⁴ Mirza Associates Engineering Services (Pvt.) Ltd. (Lead Consultant), December 2013, Feasibility Study of Balakot Hydropower Project, Volume I Main Report for Pakhtunkhwa Hydel Development Organization

available in the 20 km stretch of the river from Paras to Sangar tributary will be utilized for the Project.

A map showing the location of the Project is provided in **Exhibit 1**.

All parts of the Project are located on the left bank of the Kunhar River. The dam site (34° 38' 59"N, 73° 26' 19"E) is about 17 km upstream of the town of Balakot. The powerhouse (34° 36' 14"N, 73° 22' 50"E) is located 10 km upstream of Balakot, near Kapi Gali Village.

Project Outline

The layout of the Project is provided in **Exhibit 2**. The main components of the Project are described briefly in **Exhibit 3**.

Exhibit 1: Project Location

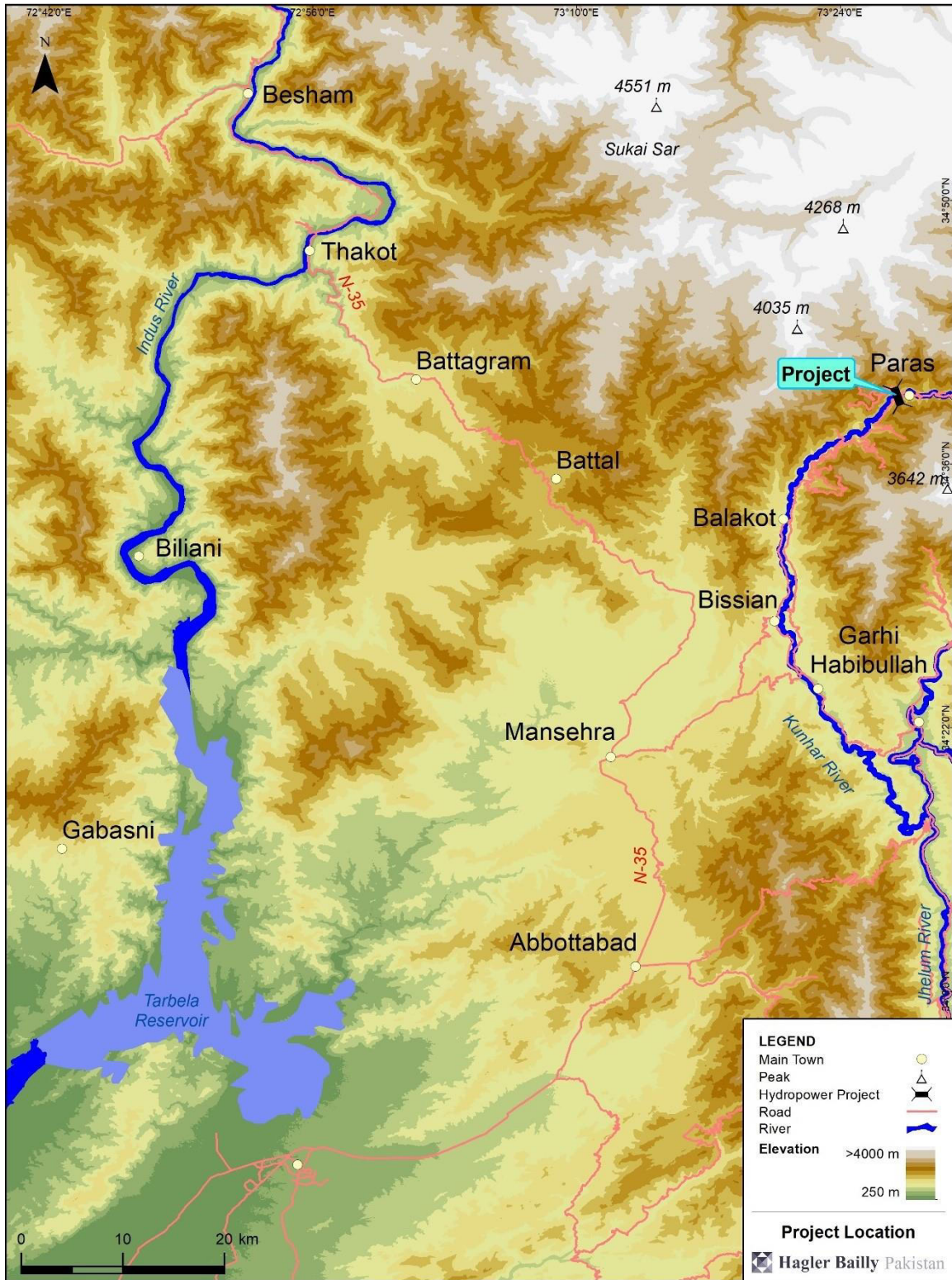


Exhibit 2: Project Layout

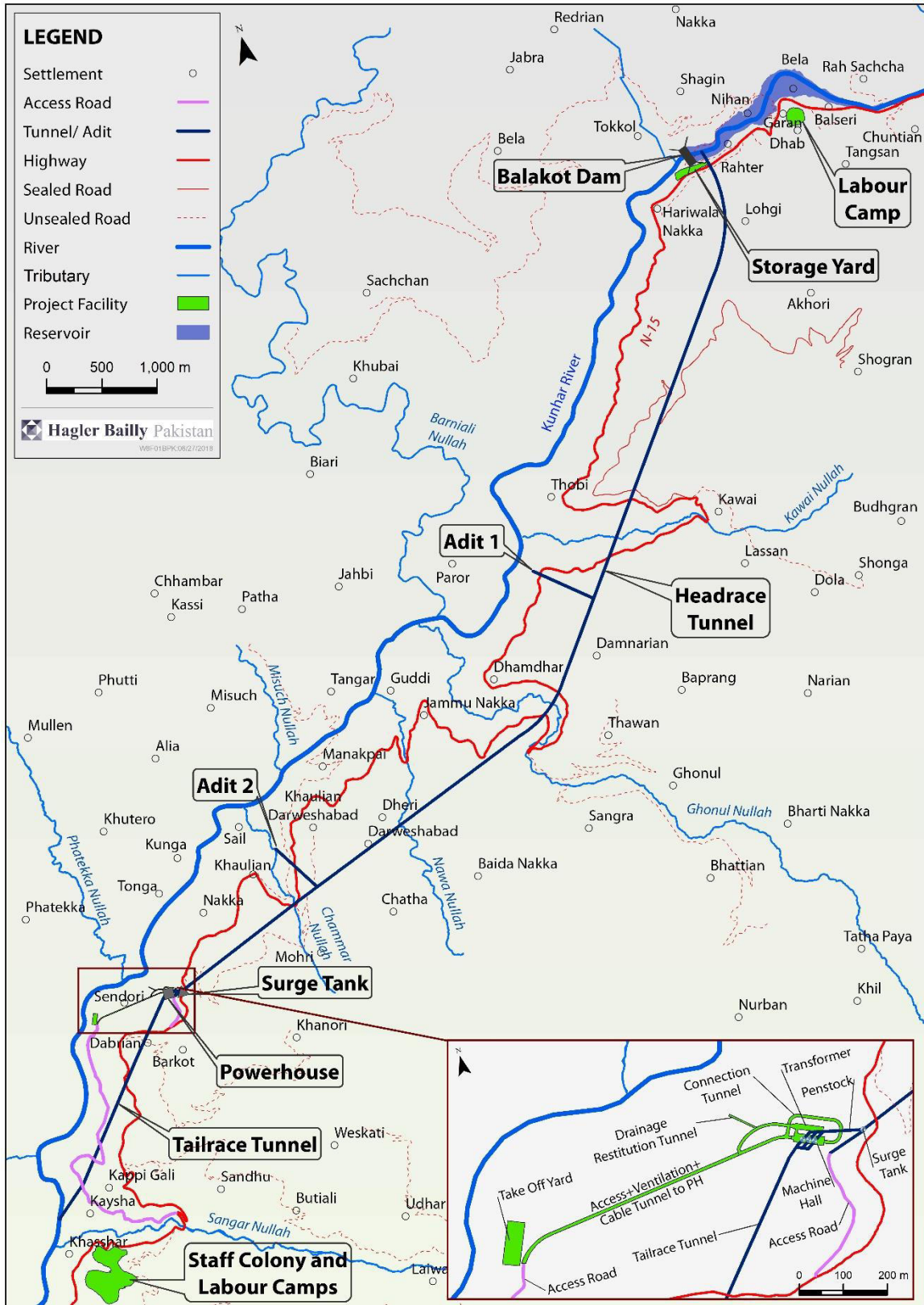


Exhibit 3: Description of the Project and Facilities

Main Dam

It will be a concrete gravity dam, having a height of 78 m from the river bed, comprising low level/flushing outlets and a gated spillway. It will be equipped with five hydraulically operated radial gates for flood discharge and are set at the crest level of 1,276 meters above sea level (m.a.s.l.). Three circular bottom outlets of diameter 5 m will be provided near the river bed for sediment flushing.

Lateral power intake structure

This will be located on the left bank of river. It will comprise three intakes to take the design discharge. A rectangular 8 m wide by 8 m high control gate equipped with upstream sealing will be provided.

Low pressure headrace tunnel

This will be of length 8,420 m and diameter of 8 m. It will be optimized for considering different diameters for the design discharge

Power Complex

An underground power complex has been proposed which will consist of an underground powerhouse cavern, a GIS transformer cavern, a main access tunnel, cable and ventilation tunnel and an open switchyard. The powerhouse will be 83.2 m long, 16.2 m wide and 25 m high from the main inlet valve floor to the arch roof crown.

Key Operational Characteristics

The maximum and minimum reservoir operating levels will be 1,288 m.a.s.l and 1,283 m.a.s.l respectively. The installed capacity will be 300 MW with mean annual energy output (average 51 years) of 1,187 GWh. Sediment flushing will be carried out every year during the summer months, when discharge is above 154 cubic meters per second (cumecs). During the low flow periods, the live storage will be used to store water during off peak hours to improve the flows for power generation in peak hours. It has been estimated that 2.566 million m³ storage would provide additional flows in four peak hours.

Land Acquisition

The Project will require land acquisition of approximately 137.5 acres. Of this 127.5 acres is for the powerhouse and reservoir while 10 acres is for the Project facilities (including staff colonies). An additional 10 acres will be acquired temporarily for labor camps and contractor offices.

Construction, Requirements and Waste

The total construction period of this Project will be 5 years (60 months).

Materials required to carry out the construction of civil works for the project include concrete aggregate, cement, pozzolans, various types of fill materials, construction chemicals, steel products etc. Deposits for coarse aggregates have been identified upstream and downstream of the dam site at Mahandri and Paras. Fine aggregate deposits have been established at Paras, Chitta Katha, and Garhi Habibullah. Fine aggregates are being mined in these areas for local use. These sources have a strong potential of being developed into a viable source of fine aggregates. Marble and limestone outcrops are exposed along the road while traveling from the proposed dam site to Naran. These are considered for development of rock quarry for obtaining coarse aggregates.

Approach to the EIA and LARP

The EIA will be undertaken in compliance with relevant national legislation and keeping in view ADB requirements. The major components of the study include:

- ▶ baseline studies to characterize the existing ecological environment in the project area;
- ▶ a public consultation process to ensure that project stakeholders are informed of the project development plan and have an opportunity to influence it;
- ▶ an analysis of the physical, ecological and socioeconomic impacts of the project, both negative and positive; and,
- ▶ suggested mitigation measures to address the identified adverse impacts.

Separate to the EIA settlement level consultations and surveys, household level consultations and surveys, of land owners and households, will be carried out in the areas identified for land acquisition by PEDO to develop the Resettlement Action Plan for the Project.

A brief overview of the conceptual components of an EIA process is given in **Exhibit 4**, whereas the detailed process to be followed for the study of ecological impacts of the Project is provided in **Exhibit 5**. A preliminary list of potential environmental and social impacts of the Project and a list of biodiversity issues that will be investigated during the EIA are provided below.

List of potential environmental and social impacts

- ▶ Provision of employment to people
- ▶ Creation of service-sector jobs, procurement of consumables and the outsourcing to local service providers.
- ▶ Construction related impacts such as noise and dust
- ▶ Reduction in power outages and revival of the affected economies
- ▶ Increase in traffic due to Project related transportation
- ▶ Disturbance due to blasting, dust, noise, vibration, road congestion, and safety hazard from heavy traffic
- ▶ Damage to infrastructure due to blasting and noise nuisance due to blasting, drilling and batching plant
- ▶ Changes to existing social and cultural norms
- ▶ Pressure on existing infrastructure as a result of influx of job seekers
- ▶ Impact on sand mining and gravel extraction
- ▶ Contamination of soil
- ▶ Transformation of landscape
- ▶ Physical displacement of some households resulting in disruption of existing socioeconomic setup

List of potential biodiversity issues

- ▶ Reduction in water quality and quantity
 - ▶ Changes in sediment load of river
-

-
- ▶ Changes in the geomorphology of the river
 - ▶ Fragmentation of fish habitat
 - ▶ Damage to natural flora and fauna and river ecosystem
 - ▶ Impact on endangered and migratory species
-

As impacts on the aquatic ecology due to the project are of importance, HBP, in collaboration with Southern Waters Ecological Research and Consulting, will employ the DRIFT (Downstream Implications of Flow Transformation) Decision Support System (DSS) approach to assess the changes in flow regime of the river on fish and other river dependent wildlife. DRIFT is a holistic approach that employs a multidisciplinary team to analyse the likely effects on a range of flow scenarios, and has been tested in Himalayan rivers. The DRIFT Process is shown in **Exhibit 6**. Its aim is to predict changes in the form of three streams of information—ecological, economic and social—that represent the three pillars of sustainable development. It incorporates a custom-built Decision Support System (DSS) that holds all the relevant data, understanding and local wisdom about the river provided by the team of river and social specialists.

The four main aims incorporated into the DRIFT process are to:

- ▶ Synthesize present relevant knowledge on the river ecosystem;
- ▶ Synthesize present relevant knowledge on use of the river;
- ▶ Predict how the river ecosystem could change with water-resource development; and
- ▶ Predict how these river changes could affect people and the economy.

Exhibit 4: Conceptual framework of EIA figure.

<i>Component</i>	<i>Main purpose</i>	<i>Activities related to Stakeholder Consultations</i>
Scoping	<ul style="list-style-type: none"> ▶ Identify the issues on which the EIA should focus. ▶ Identify project alternatives that should be evaluated during the course of the EIA. 	<ul style="list-style-type: none"> ▶ Identify institutional and community stakeholders ▶ Engage stakeholders and record issues raised ▶ Provide feedback to the EIA team to incorporate stakeholders' concern in baseline investigations and impact assessment
Baseline investigations	<ul style="list-style-type: none"> ▶ Collect background information on the environmental and social setting of the project. 	<ul style="list-style-type: none"> ▶ Incorporate additional issues raised during the baseline survey

<i>Component</i>	<i>Main purpose</i>	<i>Activities related to Stakeholder Consultations</i>
Impact assessment, studies	<ul style="list-style-type: none"> ▶ Define the potential impacts of the project ▶ Undertake specialist investigations to predict changes to environment due to the project ▶ Determine the significance of the potential impacts ▶ Identify measures for the management of the impacts ▶ Determine the residual impacts of the project after incorporation of the management measures. ▶ Evaluate the overall acceptability of the project (from environmental and social perspectives). 	<ul style="list-style-type: none"> ▶ Assess issues raised by stakeholders
Mitigation Measures and management plan	<ul style="list-style-type: none"> ▶ Environmental mitigation and monitoring plan will describe the measures proposed to ensure implementation of the mitigation measures identified during the impact assessment. It will include, for example, specific designs and plans, training requirements, resource requirements, monitoring details (sampling locations, methodology, and frequency), review and reporting requirements and budget. 	<ul style="list-style-type: none"> ▶ Assess the acceptability and practicability of the proposed mitigation measures
EIA Report Preparation	<ul style="list-style-type: none"> ▶ After the studies, the EIA team will pull together the detailed assessment of impacts and mitigation measures. This may involve liaison with various specialists to ensure correct interpretation of information and compile EIA report. 	<ul style="list-style-type: none"> ▶ Provide stakeholders with a feedback on the EIA specifically communicate how the project proponent proposes to address the issues raised by the stakeholders.
EIA submittal to regulatory authorities and decision making	<ul style="list-style-type: none"> ▶ Submittal and review of the EIA report by regulatory authorities and other interested stakeholders. The reviewers will inform about their decision on the acceptability of the Project from environmental and social perspectives and the conditions of approval for the development 	<ul style="list-style-type: none"> ▶ Attend the public hearings and respond to the issues raised during the public hearings.

Exhibit 5: Biodiversity Assessment and Management Process figure.

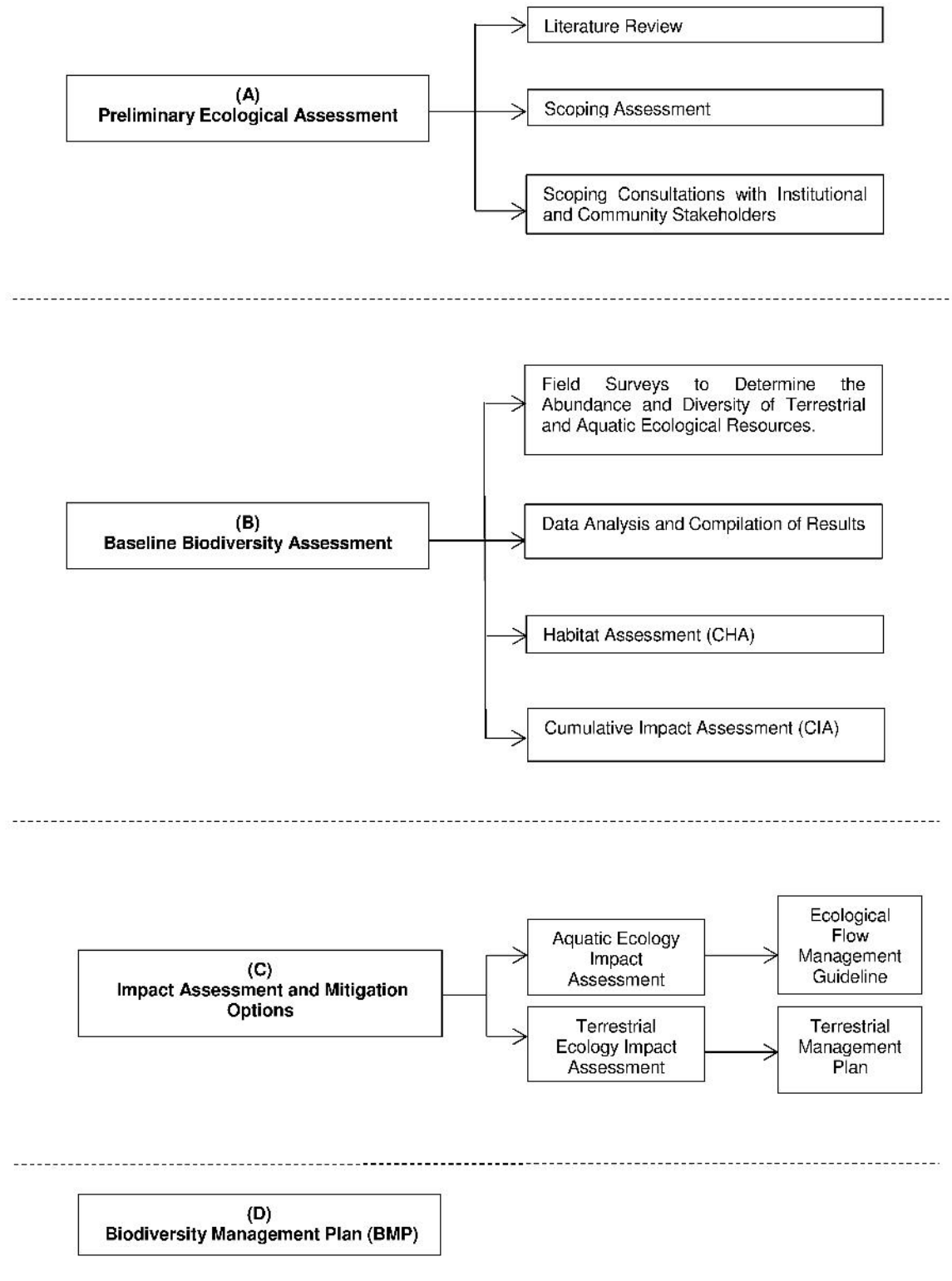
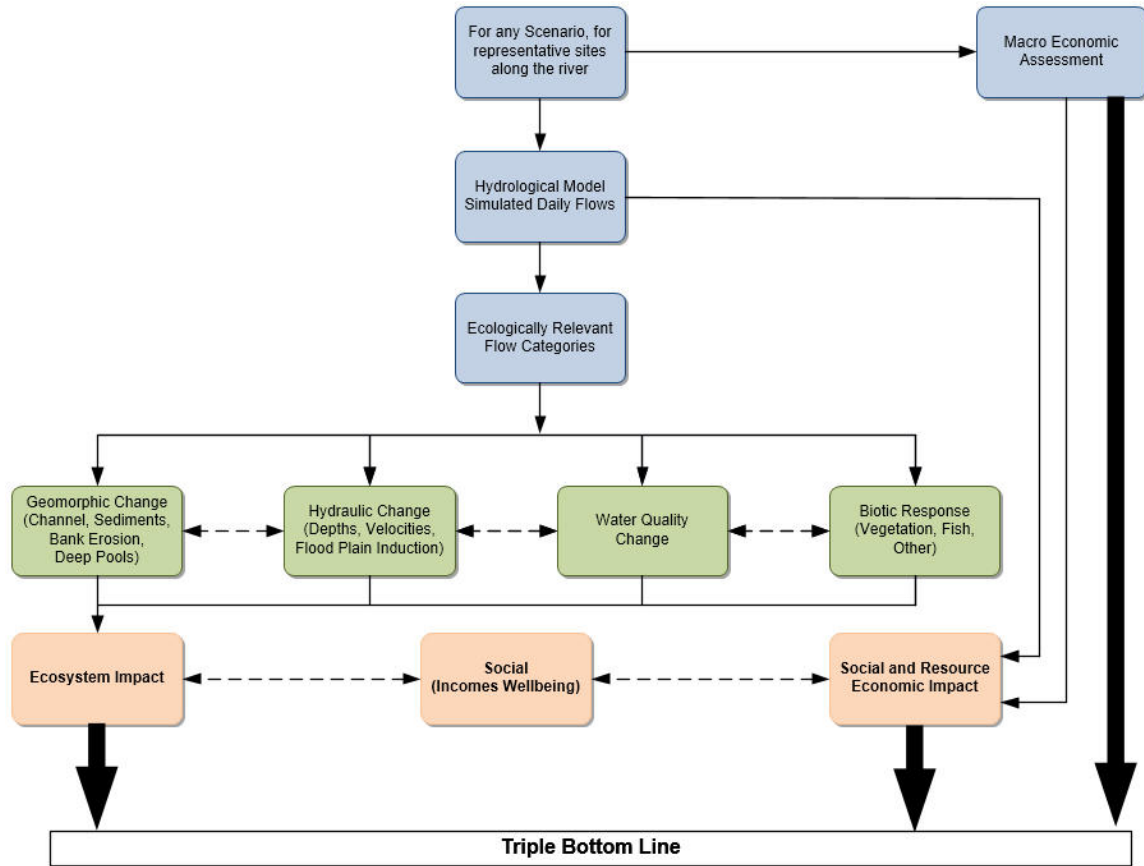


Exhibit 6: Integrated Scenario Based Approach (DRIFT DSS)



For further information on the study please contact:

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Annexure C: Consultation Log Template

Record of the Consultation

Stakeholder/s or Settlement

Consultation ESIA Consultation or Feedback Consultation

Date:

Time:

Meeting Venue:

Attended by and contact details:

Name

Contact Number

Conducted by:

Recorded by:

Reviewed by:

Language:

Preamble:

Picture/s:

<i>No.</i>	<i>Issues, Concerns and Suggestions</i>	<i>By</i>	<i>Response Provided</i>

Additional comments:

<i>No.</i>	<i>Issues, Concerns and Suggestions</i>	<i>By</i>	<i>Response Provided</i>

Annexure D: Greivance Redress Log

Complaint No.: _____ Settlement: _____ Village: _____

Name of Complainant: _____

Father/ Husband Name _____

NIC Number: _____

Contact Address: _____

Contact Number: _____

Nature of Grievance or Complaint:

Environmental:

Social:

Gender:

Details:

Complainant

Signature: _____

Name: _____

Dated: _____

Recipient

Signature: _____

Name: _____

Dated: _____

Appendix P: Record of the Consultation Meeting

P.1 Institutional Consultation Log	P-2
P.2 Community Consultation Log (Male).....	P-25
P.3 Community Consultation Log (Female)	P-62

P.1 Institutional Consultation Log

This document summarizes the institutional consultations undertaken for the EIA of Balakot Hydropower Development Project (HDIP) or Project (BAHPP).

Record of the Consultation Meeting

Stakeholder	District Management, Khyber Pakhtunkhwa	
Consultation	Stakeholder Consultation for the	
Date:	July 4, 2017	
Time:	01:15 PM	
Meeting Venue:	Office of Deputy Commissioner, Mansehra	
Attended by and contact details:	Mr. Iqbal Hussain, Deputy Commissioner, Mansehra	099-7920 170
	Mr. Faraz Qureshi, Tehsildar Land Acquisition, Mansehra	0334-5620 600
	Salman Shahid Khan	0346-9465 123
	Anwar Fazal Ahmad (AN)	0312-9791 658
Conducted by:	Salman Shahid, Anwar Fazal Ahmad	
Recorded by:	AN	
Language:	Urdu	
Preamble	Mr Hussain and Mr Qureshi were briefed about the purpose of the meeting. He was up-to-date about the Project because a Background Information Document had been shared with him.	

Issues Identified

Process of land acquisition will be as under;

- ▶ Land records of the area to be affected by the Project will be prepared after the on ground marking of the affected area.
- ▶ Revenue Department lacks staff so project should hire land acquisition staff to help revenue department prepare land records and to complete land acquisition process.
- ▶ After the preparation of land records following the request of land acquisition by PEDO, section 4 of LAA 1894 will be issued.

Record of the Consultation Meeting

Stakeholder	Revenue Department, Mansehra District	
Consultation	Stakeholder Consultation for the	
Date:	July 4, 2017	
Time:	3:45pm	
Meeting Venue:	Office of Tehsildar, Balakot	
Attended By	Anwar Fazal Ahmad (AN)	0312-9791 658
	Salman Shahid	0346-9465 123
	Mr. Asghar Shah	0342-5603 396
	Mr. Zulfiqar Ali Khan	0301-8121 522
Conducted by:	Salman Shahid (ADB Coordinator), Anwar Fazal Ahmad (AN)	
Recorded by:	AN	
Language:	Urdu	
Preamble	Mr Shah and Mr Khan were briefed about the purpose of the meeting. He was up-to-date about the Project because a Background Information Document had been shared with them.	

Issues Identified

Process of land acquisition will be as under;

- ▶ Land records of the area to be affected by the Project will be prepared after the on ground marking of the affected area.
- ▶ After the preparation of land records following the request of land acquisition by PEDO, section 4 of LAA 1894 will be issued.

Record of the Consultation Meeting

Stakeholder/s	Environmental Protection Agency, Khyber Pakhtunkhwa	
Consultation	Stakeholder Consultation for the	
Date	April 10, 2017	
Time	2pm	
Meeting Venue	EPA, KP Office, Peshawar	
Attended By	Dr. Mohammad Bashir Khan	0300-597 9823
	Syed Hidayat Hasan (HH)	0300 856 0713
	Kamran Minai (KM)	0316 298 8319
	Naimat Khan, PEDO	0333 473 7190
	Salman Shahid Khan, ADB	0346 946 5123
HBP Representatives	HH, KM	
Stakeholder Representatives	Dr. Mohammad Bashir Khan	
Conducted by	HH	
Recorded by	KM	
Language	English, Urdu	
Preamble	Dr. Bashir was briefed about the purpose of the meeting. He was up-to-date about the Project because a Background Information Document had been shared with him. The representatives from PEDO and ADB were also part of the meeting. Dr. Bashir was then asked to share his concerns regarding the Project.	

Issues Identified

Sewage dumping in the river is an existing issue.

Cutting of trees for road construction is a concern. Deforestation of thick forests will occur.

It is important to know the Environmental Flows that will result due to the Project.

Fish ladders are recommended.

There will be submergence of certain areas and this is a concern.

A colony will be created for workers and labor which could have adverse impacts.

Record of the Consultation Meeting

Stakeholder/s	World Wildlife Fund, Pakistan	
Consultation	Stakeholder Consultation for the	
Date	April 12, 2017	
Time	12pm	
Meeting Venue	WWF-P Office Islamabad	
Attended By	Rab Nawaz	+92 (344) 254 9384
	Kamran Minai (KM)	+92 (316) 298 8319
	Shakeel Ahmad (SA)	+92 (343) 981 3640
HBP Representatives	KM, SA	
Stakeholder Representatives	Rab Nawaz	
Conducted by	KM, SA	
Recorded by	KM	
Language	English	
Preamble	Rab Nawaz was briefed about the Project and was provided with a Background Information Document which he reviewed before the questions were asked. He was then asked about his concerns regarding the Project and his suggestions for mitigation.	

Issues Identified and Recommendations

Issues and Concerns

Construction Phase disturbances: Reserve forests are a concern, highly sensitive area for wildlife, Himalayan moist temperate forests. Road construction will result in loss of forests including reserve forests.

Project Location: The Project is located between Protected Areas. Here diversity is important because there is an overlap between moist temperate and dry temperate forests. A lot of animals will be displaced because of this Project. Areas of importance around the Project include Kaghan, Paras, Siri Pai, Allai and Kawai.

Species of conservation importance present: These include endemic species and those listed as Endangered or Critically Endangered on the IUCN Red List: They belong to the kingdoms of plants, birds, and mammals. This is a very critical area for wildlife. Just above Paras is a very sensitive habitat. In particular, the Himalayan Grey Langur of which there is a very large population here. Black Bear is also found here and signs of Brown Bear have been observed. There are 7-8 important bird species including for example the Western Trogon, the Long tailed Tit, Khaleej Pheasant, Kokhla Pheasant. Vulture spp. are also found here including the Griffon Vulture. This is also part of the range of the Common Leopard. Deer spp. include Ibex, Muntjak Deer, Grey Goral. Local extinctions are possible.

Seasonal Risks: There is altitudinal migration here. Species come down to this area

Slow development of Himalayan Ecosystems: Himalayan Ecosystems develop over a long period of time. The impacts of this Project will be short-term but they will be damaging.

Pollution: Air and dust pollution are a concern for wildlife.

Recommended Mitigation and Management Measures

Timing of construction is very important. The winter season is better than the summer season because in winter there is less breeding.

Strict controls on flora and fauna but especially flora from exploitation by workers.

Strict guidelines on avoiding hunting.

Protection of upstream forests is important.

Forest-targeted restoration and conservation is important. This will help by preventing landslides as well.

Taxus species should not be removed.

It is recommended that investments be made in Watershed Management Programs.

A close eye should be kept on water quality.

Focused studies are recommended especially on Taxus species, Western Trogon and Musk Deer.

Record of the Consultation Meeting

Stakeholder/s	Star Hydro Power Limited (SHPL)	
Consultation	Stakeholder Consultation for the	
Date	April 12, 2017	
Time	3pm	
Meeting Venue	SHPL Office, Islamabad	
Attended By	Syed Atif Ali Shah	0301 849 8601
	Kamran Minai (KM)	0316 298 8319
HBP Representatives	KM	
Stakeholder Representatives	Syed Atif Ali Shah	
Conducted by	KM	
Recorded by	KM	
Language	English, Urdu	
Preamble	Syed Atif Ali Shah was provided with the Background Information Document and a brief description of the Project was given with details of its key components. As the stakeholder is already involved in development of hydropower in the Kunhar Basin, the representative had read the feasibility study and was aware of the Project location and certain details.	

Issues Identified and Recommendations

Issues

Resettlement is a concern: There are 116 commercial infrastructures, a market place is being affected.

Operational impacts i.e. peaking and changes in Environmental Flows: The most important concern is the modification to environmental flows that will result due to Project operations; the Patrind HPP is downstream of the proposed Project. Both the timing and quantity of release of water are important. Even a 3-4 hour stoppage of water is a concern. In addition, stoppage of water during testing and Project operation is of concern. It is important to know the mean dry season flow after the Project is in place.

Sedimentation and flushing of sediments, including timing and quantity, is also a concern.

Impacts on ecology: There are concerns about the presence of fish species of conservation importance and impacts on river ecology.

Recommendations

Communication between developers: There should be clear communication between developers regarding the timing and level of environmental flows. This includes modification in flows as a result of peaking operations and due to flushing.

Record of the Consultation Meeting

Stakeholder/s:	Himalayan Wildlife Foundation (HWF)	
Consultation	Stakeholder Consultation for the	
Date:	April 19, 2017	
Time:	2pm	
Meeting Venue:	Hagler Bailly Pakistan Office	
Attended By	Dr Anis-ur-Rahman	0300 854 0471
	Kamran Minai	0316 298 8319
HBP Representatives	Kamran Minai (KM)	
Stakeholder Representatives	Dr Anis-ur-Rahman	
Conducted by:	KM	
Recorded by:	KM	
Language:	English	
Preamble:	Dr Rahman was familiar with the Project based on the Background Information Document provided earlier. He was provided with a brief summary of the key technical aspects of the Project design and number of people to be resettled.	

Issues Identified and Recommendations

Issues

Resettlement: The main concern is the people who will need to be relocated as a result of the Project. Their quality of life needs to improve and they need to have value added to their living standards.

Fish Species of Conservation Importance: The fish species that will be affected by the Project are important.

Recommendations

The new housing provided should be based on comprehensive planning. A sectoral approach should be taken such as that adopted in Islamabad. This resettlement should be a model for other villages in the Kaghan Valley which other people will want to emulate.

A town planner should be contracted to carry out planning for the resettlement and add value to the lives of the people. Professional town planners include Sikander Ajam Associates and Dr. M.K. Pasha. There should be planning to provide residential, commercial and amenities plots.

The resettlement being done with proper town planning will mean that the value of the properties of the locals increases.

Commitment should be made to provide the locals with as many jobs related to the Project as possible. This includes technical jobs for which training should begin as soon as possible.

The sourcing of the sediment should be from local sources. Contracts and sub-contracts should be given to the locals as far as possible, not to outsiders.

There should be an agreement with the government to provide 24 hour electricity daily to the local community that is being affected by the Project.

The maximum benefits associated with the Project should be to the locals. The resettled staff should be wealthier, not poorer and their quality of life should see a marked improvement.

HWF is interested in any activities and assistance it can provide with protection of biodiversity.

Record of the Consultation Meeting

Stakeholder/s:	Forest Department, Khyber Pakhtunkhwa	
Consultation	Stakeholder Consultation for the	
Date:	April 27, 2017	
Time:	10am	
Meeting Venue:	Forest Department Office, Mansehra, Khyber Pakhtunkhwa	
Attended By:	Sardar Tamor Ilyas, Divisional Forest Officer, Mansehra	+92 (997) 410 020, +92 (331) 800 2000
	Azhar Ali Khan, Conservator of Forests, Lower Hazara	+92 (091) 931 0232
	Kamran Minai (KM)	+92 (316) 298 8319
HBP Representatives:	KM	
Stakeholder Representatives:	Sardar Tamor Ilyas	
Conducted by:	KM	
Recorded by:	KM	
Language:	Urdu	
Preamble:	The stakeholder representatives were briefed about the Project and its impacts. They were familiar with the area and the trends of behavior of the locals.	

Concerns

Relocation of people: People will be relocated and are likely to want to move downward. This is expected based on past observations and trends in behavior of the locals; in this area people with the means to move, for example, due to improved economic status, generally choose to move to lower areas. From the perspective of the Department, this is positive as it leaves more forested area untouched at higher elevations.

Existing disturbance: The habitat in this area is already fragmented due to human activity. The locals have modified the forest area and there is a high level of disturbance.

Project footprint: The forested area in the Project footprint is not of concern because Project-related activities will not result in degradation of large forested areas.

Reserve Forests: There are no concerns with Reserve Forests as these will not be affected by the Project. Areas further away from the Project infrastructure have Reserve Forests but these will not be affected by the Project.

Size of the Project: The Department supports this development because it will generate much-needed electricity for the country. It is viewed as a positive development in addressing national needs.

Recommendation

Replantation: Compensatory replantation should be done for any loss of trees due to Project-related activities. The Department will use any funds provided for this purpose.

Ratio of replantation: The Forest Department does not have any specific ratio of replantation in mind. The Department has not yet decided whether replantation should be done in a 1:3, 1:5 or 1:10 ratio.

Record of the Consultation Meeting

Stakeholder/s:	Archaeology Department, Hazara University	
Consultation	Stakeholder Consultation for the	
Date:	April 27, 2017	
Time:	1pm	
Meeting Venue:	Archaeology Department, Hazara University	
Attended By	Dr Shakirullah, Assistant Professor	+92 (997) 414 147, +92 (300) 593 8066
	Zafar Ali, Assistant Director, Environment, PEDO	
	Salman Shahid Khan, ADB Project Coordinator	+92 (346) 946 5123
	Kamran Minai (KM)	+92 (316) 298 8319
HBP Representatives	KM	
Stakeholder Representatives	Dr Shakirullah	
Conducted by:	KM, Zafar Ali, Salman Shahid Khan	
Recorded by:	KM, Zafar Ali, Salman Shahid Khan	
Language:	Urdu, English	
Preamble:	Dr Shakirullah was briefed about the Project, including the main infrastructure components and the length of the reservoir area. He was aware of details of the EIA as described in the Background Information Document.	

Concerns

Historical Value: Mansehra is very rich in history. Within Manshera, more than one thousand sites of importance have been identified. There is important Buddhist archaeology here. Also, historically, this area has been important for trade routes.

Downstream impacts: The changes in the flow of the river may be of importance if there are any archaeological sites downstream. In particular, flooding is a concern.

Legislation: The Provincial Antiquities Act has been revised in 2016 and should be taken into consideration.

Recommendations

Need for a survey: It is important to conduct surveys before-hand to determine the archaeological value of an area where development is planned to take place. If there are any archeological artifacts of importance, excavations can be done. Assessing the area, whilst keeping in view the dam, is recommended.

Sharing of Information: Publication of proper reports is recommended once data is collected.

Record of the Consultation Meeting

Stakeholder/s:	Fisheries Department, Khyber Pakhtunkhwa	
Consultation	Stakeholder Consultation for the	
Date:	April 27, 2017	
Time:	3pm	
Meeting Venue:	Office of Fisheries Department, Mansehra, Khyber Pakhtunkhwa	
Attended By	Mohammad Tanvir, Assistant Director Fisheries, District Mansehra	+92 (303) 492 4722
	Zafar Ali, Assistant Director, Environment, PEDO	
	Salman Shahid Khan, ADB Project Coordinator	0346-946 5123
	Kamran Minai (KM)	0316-298 8319
HBP Representatives	KM	
Stakeholder Representatives	Mohammad Tanvir	
Conducted by:	KM, Zafar Ali, Salman Shahid Khan	
Recorded by:	KM, Zafar Ali, Salman Shahid Khan	
Language:	Urdu, English	
Preamble:	Dr Tanvir was aware of the Project and its details as he had attended an Eflow workshop earlier and had read the Background Information Document.	
Concerns		
Disturbance: The ecosystem already developed will be disturbed due to the Project.		
Spawning grounds: The spawning grounds of fish will be affected due to changes in flows. Native species will be killed due to this. Spawning grounds of the Alwan Snow Trout are a concern. Mr Zafar noted the importance of the two endemic species.		
Fishing licensing: Fish licenses are provided for fishing in this area. Changes in fish fauna will affect fishing in the area.		
Flushing: This is a concern because it will affect fish fauna of the reservoir. However, it was noted by Mr Salman that flushing is normally done in the flooding season when water needs to be released anyways.		
Fish Ladder: Strong fish will be able to move over the ladder but the weaker ones will not. An estimated success rate is 25-30% of the fish making it over.		
Options: Japan has removed a dam due to concerns over fish fauna, but we are not in this position.		
Pressures: Pressures other than those associated with the Project include human population growth which has increased pollution and effluent discharge into the river. The pH of water in some areas has increased as a result of this, making it unsuitable for fish. There is also noise pollution from construction activities, such as extension of roads.		

Changes in the ecosystem: Abrupt changes in temperature affect the ecosystem. Climate Change was mentioned as a possible cause by Mr Salman and recognized as an issue by Dr Tanvir.

Zoning: There are six zones of the river. Of these, one area is a sanctuary where no disturbance is allowed and fish watchers are greater in number. This is important because of the increase in fishing pressure (earlier there were 100s of people coming to fish, now 1000s show up). This is partly due to better access as a result of road extension. The zonation has changed due to impacts of pollution as the fish do not travel to areas where they previously did. The Brown Trout is an example, which shows prominent coloration in areas near Jalkhad where the water is less polluted compared to Balakot, where this species shows a less prominent coloration. However, there are differences in the food chain as well, so pollution may not be the cause.

Lack of research: There has been no research on the effects of pollution on fish fauna. Mutations may be a concern although no such abnormalities have been observed. Growth of fish has not changed.

Recommendations

Fish ladder: A fish ladder is proposed to be a part of the dam design. Mr Zafar stressed the need to explore options to increase the success rate of the fish ladder above 25-30% of the fish making it over. A review of the fish ladder design is recommended.

Flow: The flow needs to be maintained as per the agreement.

Reservoir: The 4.5 km stretch of the reservoir should be used for stocking of fish and angling. Mr Zafar stressed that invasive species should be avoided.

Safe area: A safe area for fish should be established. Mr Salman stated that an option for pond sharing should be looked into.

Hatcheries: An alternative to protection and preservation is the use of hatcheries. These should be supported. The Alwan Snow Trout has been bred successfully in other countries and a hatchery exists in Swat. Mr Zafar stated that in Pakistan there are limitations on the breeding of fish due to lack of facilities. He was of the opinion that, of the two options (in vivo and in vitro), the in vivo option is preferable.

Monitoring: Weekly pH monitoring is recommended. The current data for temperature is to be shared with PEDO.

Record of the Consultation Meeting

Stakeholder/s:	Wildlife Department, Khyber Pakhtunkhwa	
Consultation	Stakeholder Consultation for the	
Date:	April 27, 2017	
Time:	4pm	
Meeting Venue:	Office of Wildlife Department, Mansehra, Khyber Pakhtunkhwa	
Attended By	Faiq Khan, DFO, Mansehra	+92 (333) 555 4956
	Zafar Ali, Assistant Director, Environment, PEDO	
	Salman Shahid Khan, ADB Project Coordinator	+92 (346) 946 5123
	Kamran Minai (KM)	+92 (316) 298 8319
HBP Representatives	KM	
Stakeholder Representatives	Faiq Khan	
Conducted by:	KM, Zafar Ali, Salman Shahid Khan	
Recorded by:	KM, Zafar Ali, Salman Shahid Khan	
Language:	Urdu, English	
Preamble:	Mr Khan was aware of the Project as he had read the Background Information Document.	

Concerns

Violations: Wildlife violations including those which affect the aquatic habitat are being handled by the Wildlife Department.

Reservoir: The reservoir is a concern. This is mainly due to inundation of vegetation and loss of habitat. Due to the reservoir, wetland will be established which will change bird fauna. There will also be changes to flora and fauna in the riparian zone.

Lack of data: There is limited data on wildlife especially on key species, such as the Common Leopard and The Indian Palm Civet. There is a focus on game species but a lack of data on those that are not game animals. The department lacks the capacity to go into minute details of wildlife management and research.

Infrastructure development: The development of infrastructure will affect the fragile ecosystem.

Species of importance: This is a very important area for Chakhor and Khaleej Pheasant. The population of the Khaleej Pheasant is of particular concern. Passerine birds are important as well.

Non-Project related pressures: These include habitat loss and fragmentation due to expansion of settlements, and the human wildlife conflict especially for the Common Leopard and the Black Bear. After the earthquake people have moved down resulting in more area for these species to occupy. As a result their populations have increased and hence they extend their ranges and come into conflict with people. As mentioned earlier there is lack of data on wildlife; species data is needed for baseline development and monitoring. There is only regulation on game species.

Lack of staff: There is a lack of staff which results in very few watchers.

Lack of awareness: There is a lack of awareness amongst locals regarding the importance of wildlife. In particular, there is a lack of understanding regarding sustainable use and economic benefits of wildlife.

Recommendations

The need for surveys: Detailed wildlife surveys are needed. The Department needs to be included in these. Mr Zafar stated the importance of government coordination. Entomology should be included in the surveys because the food chain is of importance.

Staff capacity building: There is a need to build the capacity of the staff.

Reservoir: This should be declared a protected wetland.

Closure of areas: There are forested areas that are closed off to all activity. This is to facilitate regeneration. 120 such areas have been established in Kaghan Valley, with each ranging from 40 ha to 100 ha.

Record of the Consultation Meeting

Stakeholder/s:	Adventure Time Pakistan	
Consultation	Stakeholder Consultation for the	
Date:	May 2, 2017	
Time:	9 30am	
Meeting Venue:	Telephonic	
Attended By	Nadeem Akhtar, Director	+92 (311) 746 6171
	Kamran Minai (KM)	+92 (316) 298 8319
HBP Representatives	KM	
Stakeholder Representatives	Nadeem Akhtar	
Conducted by:	KM	
Recorded by:	KM	
Language:	English, Urdu	
Preamble:	Nadeem Akhtar had read the Background Information Document and was aware of the Project. The main infrastructure of the Project was explained to him to refresh his memory of the planned development, most importantly the dam itself, the tunnels and the staff colonies.	

Concerns

High water level: white water rafting is carried out only along the Kunhar River, in two areas. One is between the stretch from Balakot to Garhi Habibullah and the other is in Naran. Therefore, Adventure Time Pakistan would like a high water level to be maintained in this stretch.

Positive impact for tourism: In the Khanpur dam Adventure Time Pakistan organizes events for kids including camps where they are taught about first aid, watersports and where they enjoy still water kayaking. Therefore, the creation of another reservoir is, in the view of the organization, a benefit as it increases opportunities for such activities and draws in more tourists.

Recommendations

Sharing of the schedule of release of water: The schedule for release of water should be shared with everyone so that people can plan their activities accordingly.

Record of the Consultation Meeting

Stakeholder/s:	Social Welfare Department, KP	
Consultation	Stakeholder Consultation for the	
Date:	May 19, 2017	
Time:	10:30am	
Meeting Venue:	Office of District Officer Social Welfare, Mansehra	
Attended By	Abdul Rasheed, Social Welfare Officer, Mansehra	0301-8137172
	Yasmeen Saeed, Social Welfare Officer	NA
	Anwar Fazal Ahmad (AN)	0312 979 1658
	Ms. Rizwana Waraich (RW)	0331-539-6334
HBP Representatives	AN, RW	
Stakeholder Representatives	Abdul Rasheed, Social Welfare Officer, Mansehra, and Yasmeen Saeed, Social Welfare Officer	
Conducted by:	AN, RW	
Recorded by:	AN	
Language:	Urdu	
Preamble:	The Background Information Document (BID) had been shared with the organization. They were also briefed about the Project before obtaining their views.	

Concerns

Impacts on Communities: The Project will have significant impacts on local communities. A number of households will be displaced. The following will be submerged:

- ▶ Boys and girls schools.
- ▶ Basic Health Unit (BHU).
- ▶ Graves of the relatives of the affected households.

Recommendations

All the displaced households should be rehabilitated.

Public infrastructure like schools and BHUs should be relocated.

Graves should be managed with the consent of the communities

Project should provide special assistance to vulnerable households.

Households affected by livelihood should be provided with vocational trainings to get benefits from the project

Record of the Consultation Meeting

Stakeholder/s:	Kaghan Development Authority	
Consultation	Stakeholder Consultation for the	
Date:	May 22, 2017	
Time:	9am	
Meeting Venue:	Kaghan Development Authority Office	
Attended By	Fidat Tanoli, Assistant Director	0333-4300 019
	Nasir Hayat Babar, Project Director	0300-8593 045
	Kamran Minai (KM)	0316-3988 319
HBP Representatives	KM	
Stakeholder Representatives	Fidat Tanoli, Nasir Hayat Babar	
Conducted by:	KM	
Recorded by:	KM	
Language:	Urdu, English	
Preamble:	The stakeholder representative was aware of the Project details as a Background Information Document (BID) was shared with them. A brief discussion on the spatial scope of the Project and the villages near which Project facilities are planned was done to have a shared understanding of the areas that will be affected.	

Concerns

Jurisdiction: The area in which the Project infrastructure is located falls within the jurisdiction of the Kaghan Development Authority, therefore, the organization is keenly interested in this development. Therefore, the Kaghan Development Authority is a main stakeholder and representative of the Government of Khyber Pakhtunkhwa.

The Kaghan Development Authority supports this move by the Provincial Government to develop energy resources in the area, but it should include the Kaghan Development Authority.

Development: The Provincial Government has plans to promote tourism in this area through the Kaghan Development Authority, in particular, international tourism.

The Kaghan Development Authority has started a program for solid waste disposal in the area last year. The program aims to cover the area from Balakot to Babusar. It will provide sanitation, drainage and waste disposal facilities.

A water purification scheme is planned to be introduced in Naran.

A firefighting scheme is planned.

A garbage collection scheme has been started.

Further plans include development of Saif-ul-Muluk and Lulupatsar as well as the establishment of a family park in Naran and Shogran.

Natural beauty of the area: We are concerned about the natural beauty including all wild flora and fauna. Preserving and protecting the vegetation is a priority.

Functions: The functions of the Kaghan Development Authority are as a service provider, building control agency and executing agency for any scheme in the area. Therefore, this development is very important for the Kaghan Development Authority.

Development of Project facilities: As two colonies will be established, there will be increased economic and commercial activity in the area. Therefore, responsibility for the effects of this will need to be taken, for example, controlling pollution. This is the Kaghan Development Authority's area of interest.

Legislation: The Kaghan Development Authority is the owner of the area and coordination with it is required for public sector projects as well as private sector ones.

Recommendations

Sharing of information: Progress on the development of the Project should be shared with the Kaghan Development Authority regularly.

Capacity Building: A fraction of the net income from the Project should be given to the Kaghan Development Authority so that it can function effectively as a service provider. Funding is important. The Kaghan Development Authority will only be bound to provide services if they are taken on board. If the Kaghan Development Authority is provided with funding, they will not have any excuse to provide services.

Environment: The Kaghan Development Authority wants to make this area environmentally friendly.

Record of the Consultation Meeting

Stakeholder/s:	International Finance Corporation
Consultation	Stakeholder Consultation for the
Date:	May 26, 2017
Time:	6:50pm
Meeting Venue:	Communicated by letter
HBP Representatives	Kamran Minai
Stakeholder Representatives	Shahid Lutfi
Language:	English
Preamble:	The Background Information Document (BID) had been shared with the stakeholders. A conversation to discuss the main components of the dam design and the key stakeholders involved was also held. The stakeholders provided their recommendations for the ESIA process and for the Project.

Recommendations

There must be a robust impact assessment that covers potential impacts of the project on not only the Kunhar River but also the Jhelum River downstream of the confluence of the two rivers. This should address the potential impacts of peaking flows and of sediment discharges.

The alternatives analysis in the ESIA should cover different approaches to peaking flows, ranging from run-of-river to two- or four-hour daily peaking discharges. We also recommend that seasonal limitations on peaking be considered as well. IFC encourages developers to consult with relevant authority to discuss the possibility that Balakot could be operated as a run-of-river project without peaking discharges during the entire year or during key biodiversity periods of the year.

The alternatives analysis in the ESIA should cover different approaches to sediment management. This could range from different designs (e.g., dedicated sluicing gates low in the dam vs spillway releases) to different release regimes (e.g., multiple releases in the high-water season vs one or two release periods) to different levels of cooperation and coordination among cascade hydropower operators (e.g., synchronization of releases by upstream and downstream projects to unilateral scheduling of sediment releases).

The ESIA should quantify the excavated soil and rock material that would require off-site disposal. Potential sites for safe disposal of muck material should be reviewed for risks of washout, land sliding, etc. ESIA may also identify a framework to develop a detailed Muck Disposal Plan during construction stage.

The ESIA should review the impacts on downstream projects for multiple scenarios relating to construction activities, failure of cofferdam, accidental release of excavated materials and muck.

There will need to be a cumulative impact analysis that considers the cumulative impacts of overall hydropower development in the basin on endemic and endangered aquatic species that are of conservation concern. This would include impacts in the lower Jhelum River as well as in the Kunhar River. The cumulative impact assessment should also review the (provincial/state) transboundary issues relating to ecological, social, legal, and jurisdictional aspects of the project. The ESIA should take advantage of previous data collection and analyses that may be found in ESIA's and river basin planning documents for other hydropower developments.

The overall ESIA process should essentially be impact and risk based assessment, and under social assessments should include analysis on human rights, community benefit sharing, conflicts & security, etc. With context to PS4: Community Health, Safety and Security, ESIA to include some basic analysis and recommendations on dam break/failure.

The ESIA analysis may also review the project for impacts and risks on and from climate change.

The ESIA may also develop framework on integrated fish monitoring plan, biodiversity management, sand and gravel mining management, conflicts & security management plan, livelihood restoration, etc. that would require joint implementation by key stakeholders.

We encourage the developers of Project to participate in the Hydropower Developers' Working Group, and participate in supporting future activities of the Working Group. This could take the form of participating in Group meetings, direct contributions to various initiatives, as well as participating or even leading certain activities. To that end, we would very much appreciate it if you would provide to us contact information for Balakot project management.

Record of the Consultation Meeting

Stakeholder/s:	Archaeology Department, University of Peshawar	
Consultation	Stakeholder Consultation for the	
Date:	May 30, 2017	
Time:	10 00am	
Meeting Venue:	University of Peshawar	
Attended By	Dr Mukhtar Ali Durrani, Head of Department, Archaeology Department, University of Peshawar	+92 (91) 922 1048
	Dr Jamil Ahmad Chitrali (JC)	+92 (346) 939 3100
HBP Representatives	JC	
Stakeholder Representatives	Dr Mukhtar Ali Durrani	
Conducted by:	JC	
Recorded by:	JC	
Language:	Urdu, Pashto, English	
Preamble:	The Background Information Document (BID) had been shared with Dr Durrani and he was aware of the Project's details.	

Concerns

Lack of evidence with the Department: There is a lack of archaeological evidence for the Project area, therefore, the Department is not aware of any sites of concern. This has been determined in consultation with other professors in the Department including Professor Naeem Khan, Professor Ibrahim Shah and Professor Qazi Naeem.

Lack of secondary data: There is a lack of secondary data about the area as well.

Record of the Consultation Meeting

Stakeholder/s:	Tourism Corporation, Khyber Pakhtunkhwa (TCKP)	
Consultation	Stakeholder Consultation for the	
Date:	June 12, 2017	
Time:	12 30pm	
Meeting Venue:	Office of TCKP	
Attended By	Dr Jamil Ahmad Chitrali (JC)	+92 (346) 939 3100
	Mr. Mushtaq Ahmad, Managing Director (MD), TCKP	+92 (332) 992 2207
	Ms. Haseena Shoukat, In-charge Marketing, TCKP	+92 (300) 932 1297
	Mr. Johar, PSO to MD, TCKP	+92 (334) 968 6805
HBP Representatives	JC	
Stakeholder Representatives	Mr. Mushtaq Ahmad, Ms. Haseena Shoukat, Mr. Johar	
Conducted by:	JC	
Recorded by:	JC	
Language:	Pashto, Urdu, English	
Preamble:	A Background Information Document (BID) was shared with the staff earlier. They were briefed salient components of the Project.	

Concerns

Lack of data: The TCKP has no data on tourism in general and in the area where the Project is located.

Lack of capacity: There is a lack of capacity to deal with major concerns with tourism and with planning-related matters. For a long time they have been working with only 6 staff. Only recently the staff has been increased to over 100 and these people have been sent into the field to collect data.

Plans: Plans to increase domestic tourism include establishing a tourist police force and uplift of roads. The corporation is also looking to submit proposal to various donors including the World Bank to facilitate efforts to create job opportunities, training the local youth on boating, fishing and domestic hotels. They also intend to explore and develop new picnic spots and increase efforts to conserve nature.

Recommendations

Assistance with plans: The corporation is seeking assistance with successful implementation of its plans.

P.2 Community Consultation Log (Male)

This document summarizes the community consultations undertaken for the EIA of Balakot Hydropower Development Project (HDIP) or Project (BAHPP).

Record of the Consultation Meeting

Stakeholder/s or Settlement	Bela			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 2, 2017			
Time:	15:00			
Meeting Venue:	Bela at the residence of Tanveer			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Tanvir Hussain Shah	0346 2100 087	Jaffar Shah	0446 9027 700
	Azhar Shah	0300 5638 861	Mir Hussain	0343 9256 721
	Tanvir Awan	0346 2343 616	Javid Shah	0346 9672 841
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	Agricultural land will be affected due to an increase in the water level in reservoir which will affect incomes.			
2.	Change the design of project to minimize the effects on land and houses.			
3.	All the decisions which are related to community land ownership should be displayed in DC office accordingly. Although government is not considering our concerns in behalf of our land ownership.			
4.	We never sell property but given it on dowry.			
5.	We have very bad experience regarding Sukki Kinari project regarding land and house compensation so we are requesting to treat us leniently in Balakot Hydro Power Project.			
6.	Villagers will not be happy with resettlement. However, if resettlement is necessary then alternative village or houses should be built for them.			
7.	Appropriate negotiation is required between affected people and government to resettle the affectees of the project.			
8.	Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.			
9.	As this village has very important economic position due to tourism so the rate of land and house should be reasonable with respect to other places.			
10.	We have very limited land for subsistence agriculture so no one of us able to sale land.			
11.	We need high priority in employment opportunities in the project activities and no outsider is allowed to work in the project unless local would not found.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Nihan			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 2, 2017			
Time:	11:00			
Meeting Venue:	Nihan at the residence of Waqar Ahmed			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Waqar Ahmed Shah	0345 9682 409	Jabbran Shah	0343 3355 593
	Arif Shah Shah	0346 5384 270	Tahir Hussain Shah	0345 9621 179
	Usman Shah	0347 4696 132	Abid Shah	0347 6542 091
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	Our communal forest and other social fabric get destroyed.			
2.	As land record is not updated since 40 years so undistributed land is a major issue that has provides source of conflict among local community.			
3.	We will not be happy with resettlement. However, if resettlement is necessary then alternative village or houses should be built for them with in this village with same socio cultural environment.			
4.	Standard and quality of education like Kaghan model public school is a great opportunity for our children in a little fees. We can't afford this level of education anywhere else.			
5.	The dust from waste materials from tunnel boring would cause diseases and environmental problems to nearby communities/ villages.			
6.	Social security risk will increase due to increase of in-migration of labor for project construction.			
7.	Project construction activities would deteriorate the natural beauty of the village.			
8.	We do not want to move away from their ancestral graveyard, nearby the village.			

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9. Increased inflow of outsiders in the village for project activities would affect the privacy and mobility of local women.

 10. We need high priority in Employment opportunities in the project activities and no outsider is allowed to work in the project unless local would not found.

 11. Free electricity should be provided to the local communities including the some long term benefits in project like share in project income.
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Record of the Consultation Meeting

Stakeholder/s or Settlement	Rahter			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 3, 2017			
Time:	11:00			
Meeting Venue:	Rahter at the residence of Muhammad Faiz			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Sardar M Faiz	0346 9636 657	Yasir Shah	0342 9126 586
	Gulam Qadar Shah	0340 8112 338	Imtiaz Hussain	0345 9483 591
	Mukhtar Shah	0342 0554 960		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	Increased inflow of outsiders in the village for project activities would affect the privacy and mobility of local women.			
2.	We need high priority in employment opportunities in the project activities and no outsider is allowed to work in the project unless local would not found.			
3.	Free electricity should be provided to the local communities including the some long term benefits in project like share in project income.			
4.	Land record is not updated sine 40 years, undistributed land is the major issue that has provided source to new conflicts. So land record should be updated before project started.			
5.	The dust from waste materials from tunnel boring would cause diseases and environmental problems to nearby communities/ villages.			
6.	We do not want to move away from their ancestral graveyard, nearby the village.			
7.	Social security risk will increase due to increase of in-migration of labor for project construction.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Balseri			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 3, 2017			
Time:	14:20			
Meeting Venue:	Bela Balseri at the residence of Mubarak Ali Shah			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Abdul Rasheed	0344 9530 480	Saraj Ahmed	0347 9475 074
	Nadeem	0346 9608 322	Mubarak Ali Shah	0345 9761 251
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for Local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	Agricultural land will be affected due to an increase in the water level in reservoir which will affect incomes.			
2.	Change the design of project to minimize the effects on land and houses.			
3.	All the decisions which are related to community land ownership should be displayed in DC office accordingly. Although government is not considering our concerns in behalf of our land ownership.			
4.	We never sell property but given it on dowry.			
5.	We have very bad experience regarding Sukki Kinari project regarding land and house compensation so we are requesting to treat us leniently in Balakot Hydro Power Project.			
6.	Villagers will not be happy with resettlement. However, if resettlement is necessary then alternative village or houses should be built for them.			
7.	Appropriate negotiation is required between affected people and government to resettle the affectees of the project.			
8.	Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.			
9.	As this village has very important economic position due to tourism so the rate of land and house should be reasonable with respect to other places.			
10.	We have very limited land for subsistence agriculture so no one of us able to sale land.			
11.	We need high priority in employment opportunities in the project activities and no outsider is allowed to work in the project unless local would not found.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Garhi Habibullah		
Consultation	EIA of Balakot Hydropower Development Project		
Date:	May 3, 2017		
Time:	14:20		
Meeting Venue:	Garhi Habibullah at neighborhood council office		
Attended by and contact details:	Name	Designation	Phone Number
	Jhangeer Safeer Khan	Member District councilor	0335-0909-991
	Jamil Asghar Khan	Member Tehsil Councilor	0312-9552546
	Muhammad Nazakat	Nazim village councilor	0300-3005-776
	Muhammad Irtaza	General councilor	0311-5818-041
	Nadim Tariq	General councilor	0331-3636-131
	Muhammad Shamreez	General councilor	0322-9200-251
	Muhammad Tariq	General councilor	0333-5054-069
	Muhammad Tariq	General councilor	0333-5054-069
	Safi Khan	General councilor	0312-5556-356
	Saraj Ahmed Khan	General councilor	0315-6630-345
	Muhammad Ilyas	General councilor	0312-9518-936
Tanvir Akhtar	Secretary	0313-5056-448	
Conducted by:	Dr Jamil Ahmad		
Recorded by:	Muhammad Arshad		
Reviewed by:	Dr Jamil Ahmad		
Language:	Urdu and Hindko where required for local understanding and better communication		
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. The community/participants were informed briefly about the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were shared. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.		

No. Issues, Concerns and Suggestions

1. Sand mining and fishing sites will be submerged in the river affecting community wellbeing.
 2. Community needs basic amenities i.e. health, education, roads, and safe drinking water.
 3. Company should provide jobs to local people on priority basis.
 4. Land sliding will increase due to tunnels boring and walls of houses will be damaged due vibrations from tunnel boring
 5. Environmental issues will increase due to excavation, vehicles, and operation of other heavy machinery
 6. The dust from the tunnel boring activity would cause diseases and environmental problems.
 7. Traffic increase due to project activity would result in congested roads.
 8. The locals in the village collect both sand and wood debris from the river. Dam construction would block the downstream flow of the river and limit wood and sand supply.
 9. Government should provide free electricity to local communities in exchange for their support and cooperation.
 10. Dam construction would increase water levels and block the river's downstream flow of driftwood that is primarily used as fuel wood by locals. Locals will then cut forest trees, resulting in deforestation
 11. The dam will lead to increased river temperatures and will disrupt the sewage dilution process of the river.
 12. Machinery and vehicles used in project activities would cause environmental problems.
 13. Non-village residents with different cultures will come to the area because of the project and damage the community's culture.
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Record of the Consultation Meeting

Stakeholder/s or Settlement	Chuntian			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 4, 2017			
Time:	16:30			
Meeting Venue:	Chountian			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Fattiha ud din Shah	0347 8488 862	Shazaman Shah	NA
	Mukhtiar Shah	0343 8939 298	Muhammad Majid Shah	0349 8745 712
	Sayyed Taj Hussain Shah	0346 9692 512	Raffqat Shah	0343 9441 984
	Sayyed Sajjid Shah	0346 9654 291	Saffi Ullah	0346 4524 316
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	As we came to know that labour camp is proposed to construct nearby "Dabb", we don't allow to construct labor camp because it will creates social issues due to increase of in-migration of labor for project Construction. Labor camp should be outside from community settlement			
2.	We have very limited land for subsistence agriculture so no one of us able to sale land.			
3.	Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.			
4.	Up-gradation of land record should be transparent and should be done with community consultation.			
5.	Government should provide free electricity to local communities.			
6.	We are requesting for free Chinese and English Language Course for our children so that they may get new opportunities of job according to market demand			
7.	The dust from waste materials from tunnel boring would cause diseases and environmental problems			
8.	Traffic will increase and cause safety problems on roads.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Dhab			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 4, 2017			
Time:	13:15			
Meeting Venue:	Dhab			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Sayyed Ameen	0345 9628 643	Dildar Hussain Shah	0343 9403 271
	Sayyed Muzaffar Hussain	0345 9487 040	Abdu Wahab Shah	Nil
	Sayyed Mukhtiar Ahmed	0345 3874 249	Liaqat Hussain Shah	0346 9647 104
	Sayyed Akhtar Hussain	0342 9556 733	Faiz Hussain Shah	0345 9180 162
	Sayyed Munir Hussain	0437 9474 973	Noor Hussain Shah	0341 1920 002
	Sayyed Saddiqat Ali	0346 9672 379	Fida Hussain Shah	0344 9559 326
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	We do not allow to construct labor camp inside the village as increased inflow of outsiders in the village for project activities would affect the privacy and mobility of local women. No one of us will sale land for labor and it is requested to shift proposed labor camp out side village.			
2.	We have very limited land for subsistence agriculture so no one of us able to sale land for labor camp or colony establishment for resettlement of project affectees.			

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3. Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.

 4. Up gradation of land record should be transparent and should be done with community consultation.

 5. Villagers will not be happy with resettlement. However, if resettlement is necessary then alternative village or houses should be built for them.

 6. Appropriate negotiation is required between affectees people and government to resettle the affected of the project.

 7. Expressed need for basic amenities i.e. health, education, roads, safe drinking water etc

 8. We are all socially connected to each other if community of Nahan, Rattar and Bela Balsari is shifted, we directly will influenced by the migration of these people. So it is suggested to resettle these community nearby our village so that our interaction would maintained.

 9. We are requesting for free Chinese and English Language Course for our children so that they may get new opportunities of job according to market demand

 10. The dust from waste materials from tunnel boring would cause diseases and environmental problems

 11. Traffic will increase and cause safety problems on roads.

 12. Government should provide free electricity to local communities.
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Record of the Consultation Meeting

Stakeholder/s or Settlement	Garan			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 4, 2017			
Time:	10:00			
Meeting Venue:	Garan			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Sayed Mubarak Ali Sha	0343 9692 175	Muhammad Iqbal Shah	0346 9610 052
	Muhammad Asif	0346 9645 402	Abdullah Shah	0342 1937 244
	Saeed Shah	NA	Manzoor Ahmed Shah	0347 9356 057
	Faiz Hussain Shah	0342 9137 342	Javid Awan	0343 8907 419
	Muhammad Taj Shah	0346 9692 562	Ibrar Shah	0346 9646 601
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	All the decisions which are related to community land ownership should be displayed in DC office accordingly. Although government is not considering our concerns in behalf of our land ownership.			
2.	Community has much concern regarding availability of Patwari for correction of record.			
3.	We have very bad experience regarding Sukki Kinari project regarding land and house compensation so we are requesting to treat us leniently in Balakot Hydro Power Project.			
4.	Villagers will not be happy with resettlement. However, if resettlement is necessary then alternative village or houses should be built for them.			
5.	Appropriate negotiation is required between affected people and government to resettle the affectees of the project.			
6.	Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.			
7.	Up-gradation of land record should be transparent and should be done with community consultation.			
8.	We have very limited land for subsistence agriculture so no one of us able to sale land.			
9.	As we came to know that labour camp is proposed to construct nearby "Dabb", we don't allow to construct labor camp because it will creates social issues due to increase of in-migration of labor for project Construction. Labor camp should be outside from community settlement.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Kaysha UC Kewai	
Consultation	EIA of Balakot Hydropower Development Project	
Date:	May 5, 2017	
Time:	10:45	
Meeting Venue:	Kaysha, at the residence of Molvi Abdul Haq	
Attended by and contact details:	Name	Phone Number
	Abdul Rehman	03429516183
	Muhammad Bilal	03465430111
	Molvi Abdul Haq	03462343616
Conducted by:	Dr Jamil Ahmad	
Recorded by:	Muhammad Arshad	
Reviewed by:	Dr Jamil Ahmad	
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)	
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.	
<i>No.</i>	<i>Issues, Concerns and Suggestions</i>	
1.	Water supply from the springs and streams may dry out as result of project construction.	
2.	We collect wood logs from river, after tunnel formation we will be deprived of this resource.	
3.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.	
4.	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.	
5.	Government should provide free electricity to local communities. Our village is to be benefited from the state development like poor kids taken care by parents	
6.	We need basic amenities like any other citizen of Pakistan i.e. Road, health, education, safe drinking water etc.	
7.	As we are taking fish for refreshment but due to low flow of water fish would reduce that directly impact our livelihood. We have to purchase fish from market which will certainly increase our household expenditure. We don't have additional sources of income.	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Thobi UC Kewai			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 5, 2017			
Time:	10:45			
Meeting Venue:	Thobi, at the residence of Muhammad Saeed			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	M.Saeed	0346 9608 321	Imdad Hussain	0346 9618 650
	M.Safdar	0322 7437 290	Muhammad Khursheed	0346 9601 477
	Multan Khan	0345 9623 808	Aizi Ur Rehman	0344 9564 656
	M.Yousaf	0343 9522 143	Safdar	0346 3993 872
	M.Naeem	0349 8400 470	Muhammad Zakar	0346 9623 569
	M.Zaman	0345 4438 367		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	This village has no relevance to the river but is fully dependent on spring water for drinking purpose. Both human and animals are fed through this natural resource. There is only one spring from where we have constructed our drinking water supply scheme. According to the information provided our vital spring is definitely to be abolished. What you will do for us?			
2.	Water supply from the springs and streams may dry out as result of project construction.			
3.	Government should provide free electricity to local communities. Our village is to be benefited from the state development like poor kids taken care by parents			
4.	Our primary occupation is driving. If required any vehicle or driver give us high priority in Employment opportunities in the project activities.			
5.	We need basic amenities like any other citizen of Pakistan i.e. health, education, safe drinking water etc.			
6.	Land sliding may increase due to cutting and excavation in quarry areas. We are already suffered in last earthquake, why we are been put into trouble again, now by the state.			
7.	The vibrations created by blasting for tunnels will damage house walls and make land unstable.			
8.	As we are taking fish for refreshment but due to low flow of water fish would reduce that directly impact our livelihood. We have to purchase fish from market which will certainly increase our household expenditure. We don't have additional sources of income.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Rah Sachcha			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 5, 2017			
Time:	15:47			
Meeting Venue:	Rah Sachcha			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Waqar Ahmed	0433 1965 890	Aqeel Saqab	0348 9727 482
	M.Naseem	0341 9520 243	Saqab	0313 5552 305
	Sayyed Ashfaq Shah	0348 8871 134	Muhammad Rafiq	0347 5420 473
	Muhammad Imtiaz	0345 3835 856	Mushtaq	0348 0017 525
	Usman	0342 9874 305		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	Population is increasing day by day, we don't have extra land for reallocation of involuntary resettlement. It is suggested that Government should provide plot to affectees at the rate of 4-5 lac in district Mansehra.			
2.	Community of Nahian, Bela Balsari have some alternate personal or communal land nearby their village, it would be suitable if Government could help them to reallocate in that place. And provide reasonable rate to affectees.			
3.	Its overall approach that our people do not prefer to live in a colony as there is a chance to produce some social issues. So it would be better to give the reasonable rate of houses according to their mode of construction and let them free to resettle.			
4.	Government should provide free electricity to local communities.			
5.	Expressed need for basic amenities i.e. health, education, road and safe drinking water etc.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Manakpai			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 7, 2017			
Time:	11:00			
Meeting Venue:	Manakpai			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Maskeen	0344 9537 423	Habib ur Rehman	0322 9927 013
	Muhammad Fareed	0343 9532 892	Yasir	0347 3821 394
	Muhammad Yasir	0322 8529 545	Mirza	0340 9137 217
	Raiz	03451028 676	Noor Rehman	0346 9623 650
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	We collect wood logs from river, after tunnel formation we will be deprived of this resource.			
2.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would be reduced and may directly impact our livelihood.			
3.	Water supply from the springs and streams may dry out as a result of project construction.			
4.	We need basic amenities i.e. health, education, roads, safe drinking water etc.			
5.	The dust from waste materials from tunnel boring would cause diseases and environmental problems.			
6.	Traffic will increase and cause safety problems on roads.			
7.	Government should provide free electricity to local communities.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Sail			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 7, 2017			
Time:	13:00			
Meeting Venue:	Sail the residence of Shafiq			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Sohal	0346 9664 937	Abdul Shakoor	0342 9571 302
	Muhammad Amir	0344 0950 156	Shafiq	0346 9054 188
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
<i>No.</i>	<i>Issues, Concerns and Suggestions</i>			
1.	This village has no relevance to the river but is fully dependent on stream water for drinking purpose. Both human and animals are fed through this natural resource, after tunnel formation water table will reduce that affect our drinking water from streams.			
2.	As we are taking fish for refreshment but due to low flow of water fish would reduce that directly impact our livelihood. We have to purchase fish from market which will certainly increase our household expenditure. We don't have additional sources of income.			
3.	We collect wood logs from river, after tunnel formation we will deprive from this resource.			
4.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.			
5.	We need for basic amenities i.e. health, education, roads, safe drinking water etc.			
6.	The dust from waste materials from tunnel boring would cause diseases and environmental problems			
7.	Traffic will increase and cause safety problems on roads.			
8.	Government should provide free electricity to local communities.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Sendori			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 8, 2017			
Time:	11:45			
Meeting Venue:	Sendori at the residence of Muhammad Saeed			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Main Gulam Jallani	NA	Muhammad Bashir	NA
	Fida Hussain	NA	Maqbool	0343 9539 718
	Muhammad Rafiq	0345 6539 077	Nasir	0346 5495 420
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
<i>No.</i>	<i>Issues, Concerns and Suggestions</i>			
1.	Water supply from the springs and streams may dry out as result of project construction.			
2.	Government should provide free electricity to local communities. Our village is to be benefited from the state development like poor kids taken care by parents			
3.	Increased inflow of outsiders in the village for project activities would affect the privacy and mobility of local women.			
4.	Social security risk will increase due to increase of in-migration of labor for project construction.			
5.	Project construction activities would deteriorate the natural beauty of the village.			
6.	We need basic amenities like any other citizen of Pakistan i.e. Road, health, education, safe drinking water etc.			
7.	The vibrations created by blasting for tunnels will damage house walls and make land unstable.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Khasshar			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 9, 2017			
Time:	11:15			
Meeting Venue:	Khasshar at the rednece of Muhammad Bashir			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Muhmmad Bashir	0346 3993 862	Maqbool Rehman	0346 4114 740
	Muhammad Sajid	NA	Zaheer Maqbool	NA
	Junid Bashir	NA		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
<i>No.</i>	<i>Issues, Concerns and Suggestions</i>			
1	We need basic amenities like any other citizen of Pakistan i.e. electricity, health, education, safe drinking water etc.			
2	We collects wood logs from river, after tunnel formation we will deprive from this resource.			
3	We are collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood.			
4	We need high priority in employment opportunities in the project activities.			
5	Government should provide free electricity to local communities as they did in the past for many projects similar in nature.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Sangar	
Consultation	EIA of Balakot Hydropower Development Project	
Date:	May 9, 2017	
Time:	12:10	
Meeting Venue:	Sangar	
Attended by and contact details:	Name	Phone Number
	Muhammad Asghar	0306 8142 877
	Danish Amin	0311 5430 953
	Liaqat Faried	0331 9303 148
Conducted by:	Dr Jamil Ahmad	
Recorded by:	Muhammad Arshad	
Reviewed by:	Dr Jamil Ahmad	
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)	
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.	
No.	<i>Issues, Concerns and Suggestions</i>	
1.	As we came to know that labour camp is proposed to construct nearby "Dabb", we don't allow to construct labor camp because it will creates social issues due to increase of in-migration of labor for project Construction. Labor camp should be outside from community settlement	
2.	We have very limited land for subsistence agriculture so no one of us able to sale land.	
3.	Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.	
4.	Up-gradation of land record should be transparent and should be done with community consultation.	
5.	Government should provide free electricity to local communities.	
6.	We are requesting for free Chinese and English Language Course for our children so that they may get new opportunities of job according to market demand	
7.	The dust from waste materials from tunnel boring would cause diseases and environmental problems	
8.	Traffic will increase and cause safety problems on roads.	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Lower Patlang	
Consultation	EIA of Balakot Hydropower Development Project	
Date:	May 9, 2017	
Time:	14:00	
Meeting Venue:	Lower Patlang	
Attended by and contact details:	Name	Phone Number
	Shakoor Hussain	0347 4841 356
	Musabar Hussain	0346 6413 642
Conducted by:	Dr Jamil Ahmad	
Recorded by:	Muhammad Arshad	
Reviewed by:	Dr Jamil Ahmad	
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)	
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.	
No.	<i>Issues, Concerns and Suggestions</i>	
1.	We need high priority in employment opportunities in the project activities.	
2.	We need basic amenities like any other citizen of Pakistan i.e. electricity, health, education, safe drinking water etc.	
3.	We collect wood logs from river, after tunnel formation we will be deprived of this resource.	
4.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would be reduced and may directly impact our livelihood.	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Shahotar			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 10, 2017			
Time:	16:49			
Meeting Venue:	Shahotar at the residence of Masab Umair			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Masab Umair	0313 5839 250	M.Pervaiz	0306 5523 747
	Abdul Rehman	0346 9564 302	Muhammad Ayaz	0345 9848 414
	Shahid Hussain	0345 9549 135	Qamar Zaman	0347 9189 878
	Muhammad Afzal	0301 6492 772	M.Saraj	0348 9354 720
	Faiz Ahmed	0340 9370 100	M.Rasheed	0300 9118 638
	Javid Ahmed	0348 9139 389		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
2.	We collect wood logs from river, after tunnel formation we will be deprived of this resource.			
3.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.			
4.	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Bissian			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 10, 2017			
Time:	10:50			
Meeting Venue:	Bissian at the residence of Safeer			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Muhammad Jaffar	0341 9520 994	Muhammad Iyas	0300 4681 008
	Muhammad Raiz	0342 9658 291	Muhammad Safeer	0312 3568 112
	Javid Khan	0300 5864 840	Sharaz Ahmed	0315 5588 666
	Toufeeq	0334 3234 822		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			

No. Issues, Concerns and Suggestions

1. We collect wood logs from river, not only fuel wood but some people sell this captured wood into market on commercial rate, after tunnel formation we will deprive from this resource that may directly alter our livelihood.
2. We need high priority in Employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.
3. We are collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.
4. It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.

Record of the Consultation Meeting

Stakeholder/s or Settlement	Badwar			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 10, 2017			
Time:	11:33			
Meeting Venue:	Badwar at Masque			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Muhammad Azam	0348 9727 653	Gulam Mustafa	0323 5817 618
	Shafaqat Hussain	0344 2142 837	Gulam Murtaza	0232 4111 499
	Faiz Muhammad	NA	Jhanzab	0344 8569 208
	Ijaz Ahmed	0344 0950 121		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Gojri./Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	We don't have sufficient agriculture land for, so we have to utilize land on crop sharing for subsistence agriculture at two villages namely Naran and Batakundi for the last 30 years. Now Qasam Shah (land owner and local politician) want to sale out the land to the state for natural park. This will effect our income from agriculture and we may struggle for livelihood.			
2.	We collects wood logs from river, after tunnel formation we will deprive from this resource.			
3.	We are collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.			
4.	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			
5.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
6.	Government should provide free electricity to local communities as they did in the past for many projects similar in nature. Our village is to be benefited from the state development like poor kids taken care by parents			
7.	We need basic amenities like any other citizen of Pakistan i.e. health, education, safe drinking water etc			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Hassamabad			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 9, 2017			
Time:	11:51			
Meeting Venue:	Hassamabad			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Muhammad Asghar	0306 8142 877	Liaqat Faried	0331 9303 148
	Danish Amin	0311 5430 953		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
<i>No.</i>	<i>Issues, Concerns and Suggestions</i>			
1	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
2	We collect wood logs from river, after tunnel formation we will deprive from this resource.			
3	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.			
4	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Hisari	
Consultation	EIA of Balakot Hydropower Development Project	
Date:	May 10, 2017	
Time:	13:21	
Meeting Venue:	Hisari at the residence of Kashaf Khan	
Attended by and contact details:	Name	Phone Number
	Kashaf Khan	0347 9900 099
	Fasal	0314 5442 208
	Abid Khan	0312 9875 189
Conducted by:	Muhammad Arshad	
Recorded by:	Muhammad Arshad	
Reviewed by:	Dr Jamil Ahmad	
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)	
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.	
No.	<i>Issues, Concerns and Suggestions</i>	
1.	We collect wood logs from river, not only fuel wood but some people sell this captured wood into market on commercial rate, after tunnel formation we will be deprived of this resource that may directly alter our livelihood.	
2.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.	
3.	We hunt fish for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Boli			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 10, 2017			
Time:	16:49			
Meeting Venue:	Boli At Hotel			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Shafaqat Hussain	0301 8706 887	Shazad	0345 1028 304
	Altaf hussain	0334 5282 961	Arshad hussain	0301 8140 343
	Muhammad haroon	NA	Muhammad Saeed	0345 1561 521
	Muhammad Irfan	0342 4186 118		
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No. Issues, Concerns and Suggestions				
1.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
2.	We collect wood logs from river, after tunnel formation we will be deprived of this resource.			
3.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.			
4.	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Shohal Najaf Khan			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 11, 2017			
Time:	13:00			
Meeting Venue:	Shohal Najaf Khan At Hotel			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Ahsan Ahmed	0314 9355 555	Nasir Ahmed	0342 5671 234
	Muhammad Javid Qureshi	0345 4878 302	Sohal Khan	0313 0521 852
Conducted by:	Dr Jamil Ahmad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			

No. Issues, Concerns and Suggestions

1. Village Shohal has agriculture land, in the past when irrigation system was efficient, the yield of land was much better but after earthquake this irrigation system had vanished as a result farmer suffer if this project established two channels from dame site and provide water to agriculture land that could uplift our economy.
2. We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.
3. We collect wood logs from river, after tunnel formation we will deprive from this resource.
4. We are collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Balakot market. This will certainly increase our household expenditure. We don't have additional sources of income.
5. It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.

Record of the Consultation Meeting

Stakeholder/s or Settlement	Gul Dhari			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 14, 2017			
Time:	10:36			
Meeting Venue:	Gul Dhari at the residence of Nazar Hussain Shah			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Nazar Hussain Shah	0312 9674 871	Akhtar Khan	0345 6320 728
	Sayyed Saqab Hussain	0331 9816 514	Sajjid	0340 0194 792
	Muhammad Saddique	0346 9605 079	Shoukat	0349 9131 891
Conducted by:	Muhammad Arshad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for local understanding and better communication)			
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
2.	We collect wood logs from river, not only fuel wood but some people sell this captured wood into market on commercial rate, after tunnel formation we will be deprived of this resource that may directly alter our livelihood.			
3.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood. We don't have enough purchasing power and cash economy to carry sand from Lawrencepur market. This will certainly increase our household expenditure. We don't have additional sources of income.			

Record of Consultation

Stakeholder/s or Settlement	Tarana		
Consultation	ESIA consultation		
Date:	May 16, 2017		
Time:	15:43		
Meeting Venue:	Tarana at Ever Green Hotel		
Meeting Coordinates:			
Attended by and contact details:	Name	Phone Number	
	Noor ur Rehman	03459464303	
	Imran	03449518096	
	Rasheed	03413279197	
Conducted by:	Muhammad Arshad		
Recorded by:	Muhammad Arshad		
Reviewed by:	Dr Jamil Ahmad		
Language:	Urdu and Hindko where required for Local understanding and better communication		
Permeable:	<p>Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.</p>		
<i>No.</i>	<i>Issues, Concerns and Suggestions</i>	<i>Response by</i>	<i>Response Provided</i>
1	We need high priority in Employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.	Noor ur Rehman	This can be taken up as a reasonable concern.
2	We collect wood logs from river, after tunnel formation we will deprive from this resource.	Noor ur Rehman	Point noted.

Record of the Consultation Meeting

Stakeholder/s or Settlement	Karnol			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 15, 2017			
Time:	11:10			
Meeting Venue:	Karnol			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Muhammad Sadaqat	0344 1098 666	Muhammad Loqman	NA
	Abdul Majid	0345 9549 067	Muhammad Nasir	NA
	Muhammad Yaqoob	0344 1098 555		
Conducted by:	Muhammad Arshad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu and Hindko where required for local understanding and better communication			
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
<i>No. Issues, Concerns and Suggestions</i>				
1.	Government should provide free electricity to local communities. Our valley is to be benefited from the state development like poor kids taken care by parents			
2.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
3.	We collect wood logs from river, after tunnel formation we will be deprived from this resource.			
4.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood.			
5.	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Talhatta			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 16, 2017			
Time:	11:02			
Meeting Venue:	Talhatta at the residence of Ashaq Hussain Shah			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Ashaq Hussain Shah	034 29833 508	Ali Raza Shah	0321 5464 427
	Asif Hussain Shah	0345 0572 786	Raheel Haider	0344 9082 951
	Naiz Shah	0345 4775 338		
Conducted by:	Muhammad Arshad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu and Hindko where required for local understanding and better communication			
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	Issues, Concerns and Suggestions			
1	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
2	We collect wood logs from river, after tunnel formation we will be deprived from this resource.			
3	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood.			
4	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Shohal Mazullah			
Consultation	EIA of Balakot Hydropower Development Project			
Date:	May 18, 2017			
Time:	11:00			
Meeting Venue:	Shohal Mazullah at village councilor office			
Attended by and contact details:	Name	Phone Number	Name	Phone Number
	Muhammad Saleem Khan	03458633373	Nayyar ahmed Khan	03125198448
	Muhammad Tariq	03005610926	Munir Ahmed Khan	03135653648
	Muhammad Saraj	03478973942		
Conducted by:	Muhammad Arshad			
Recorded by:	Muhammad Arshad			
Reviewed by:	Dr Jamil Ahmad			
Language:	Urdu and Hindko where required for local understanding and better communication			
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.			
No.	<i>Issues, Concerns and Suggestions</i>			
1.	Due to catastrophic flood, or breakage of dame, we might suffer, what is the backup plan for our village?			
2.	We need high priority in employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.			
3.	We collect wood logs from river, after tunnel formation we will be deprived from this resource.			
4.	We collect and use local river sand for house construction. Due to the proposed tunnel formation sand would get reduced and may directly impact our livelihood.			
5.	It's not only about sand but also local fish that we hunt for refreshments (not regular food). The project would reduce chances of getting this entertainment and may directly alter our livelihood.			

Record of the Consultation Meeting

Stakeholder/s or Settlement	Takool		
Consultation	ESIA consultation		
Date:	May 6, 2017		
Time:	16:00		
Meeting Venue:	Takool at the residence of Gulam Qasam		
Attended by and contact details:	Name	Phone Number	
	Gulam Qadar	03469619263	
	Abdul Shakoor	03457012838	
	Abdul Jabran	03425259991	
Conducted by:	Dr Jamil Ahmad		
Recorded by:	Muhammad Arshad		
Reviewed by:	Dr Jamil Ahmad		
Language:	Urdu (Muhammad Arshad assisted in Hindko where required for Local understanding and better communication)		
Permeable:	Dr Jamil introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities like labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.		
No.	Issues, Concerns and Suggestions	Response by	Response Provided
1.	Agricultural land will be affected due to an increase in the water level in reservoir which will affect incomes.	Gulam Qadar	
2.	Change the design of project to minimize the effects on land and houses.	Abdul Shakoor	
3.	We have very bad experience regarding Suki Kanari project regarding land and house compensation so we are requesting to treat us leniently in Balakot Hydro Power Project.	Gulam Qadar	
4.	Villagers will not be happy with resettlement. However, if resettlement is necessary then alternative village or houses should be built for them.	Gulam Qadar	
5.	Appropriate negotiation is required between affected people and government to resettle the affecties of the project.	Gulam Qadar	
6.	Land record should be updated according to latest market rate as 50 years back land record was develop but it is not updated yet.	Gulam Qadar	
7.	We have very limited land for subsistence agriculture so no one of us able to sale land.	Abdul Jabran	
8.	We need high priority in Employment opportunities in the project activites and no outsider is allowed to work in the project unless local would not found.	Gulam Qadar	

Record of the Consultation Meeting

Stakeholder/s Settlement	or Narah												
Consultation	ESIA consultation												
Date:	May 19, 2017												
Time:	09:45 am												
Meeting Venue:	Narah												
Attended by and contact details:	<table border="1"> <thead> <tr> <th>Name</th> <th>Phone Number</th> </tr> </thead> <tbody> <tr> <td>Imran Ahmad</td> <td>03449518096</td> </tr> <tr> <td>Khurshid</td> <td></td> </tr> <tr> <td>Muhammad Shoaib</td> <td></td> </tr> <tr> <td>Maqbool</td> <td>0344-5002173</td> </tr> <tr> <td>Abid</td> <td>0301-5089265</td> </tr> </tbody> </table>	Name	Phone Number	Imran Ahmad	03449518096	Khurshid		Muhammad Shoaib		Maqbool	0344-5002173	Abid	0301-5089265
Name	Phone Number												
Imran Ahmad	03449518096												
Khurshid													
Muhammad Shoaib													
Maqbool	0344-5002173												
Abid	0301-5089265												
Conducted by:	Muhammad Arshad												
Recorded by:	Muhammad Arshad												
Reviewed by:	Dr Jamil Ahmad												
Language:	Urdu and Hinko where required for Local understanding and better communication												
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.												
No.	Issues, Concerns and Suggestions	Response by	Response Provided										
1	We need high priority in Employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.	Maqbool	This can be taken up as a reasonable concern.										
2	We collect wood logs from river, after tunnel formation we will deprive from this resource.	Abid	Point noted.										

Record of the Consultation Meeting

Stakeholder/s Settlement	or Poli												
Consultation	ESIA consultation												
Date:	May 19, 2017												
Time:	14:45												
Meeting Venue:	Poli												
Attended by and contact details:	<table border="1"> <thead> <tr> <th>Name</th> <th>Phone Number</th> </tr> </thead> <tbody> <tr> <td>Abdul Rasheed</td> <td></td> </tr> <tr> <td>Ghulam Qadir</td> <td></td> </tr> <tr> <td>Ali Hassan</td> <td></td> </tr> <tr> <td>Ahmad</td> <td></td> </tr> <tr> <td>Ilyas</td> <td></td> </tr> </tbody> </table>	Name	Phone Number	Abdul Rasheed		Ghulam Qadir		Ali Hassan		Ahmad		Ilyas	
Name	Phone Number												
Abdul Rasheed													
Ghulam Qadir													
Ali Hassan													
Ahmad													
Ilyas													
Conducted by:	Muhammad Arshad												
Recorded by:	Muhammad Arshad												
Reviewed by:	Dr Jamil Ahmad												
Language:	Urdu and Hinko where required for Local understanding and better communication												
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.												
No.	Issues, Concerns and Suggestions	Response by	Response Provided										
1	We need high priority in Employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.	Abdul Rasheed	This can be taken up as a reasonable concern.										
2	We collect wood logs from river, after tunnel formation we will deprive from this resource.	Ali Hassan	Point noted.										

Record of the Consultation Meeting

Stakeholder/s Settlement	or Taranna								
Consultation	ESIA consultation								
Date:	May 16, 2017								
Time:	15:43								
Meeting Venue:	Taranna at Ever Green Hotel								
Attended by and contact details:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Name</th> <th>Phone Number</th> </tr> </thead> <tbody> <tr> <td>Noor ur Rehman</td> <td>03459464303</td> </tr> <tr> <td>Imran</td> <td></td> </tr> <tr> <td>Rasheed</td> <td>03413279197</td> </tr> </tbody> </table>	Name	Phone Number	Noor ur Rehman	03459464303	Imran		Rasheed	03413279197
Name	Phone Number								
Noor ur Rehman	03459464303								
Imran									
Rasheed	03413279197								
Conducted by:	Muhammad Arshad								
Recorded by:	Muhammad Arshad								
Reviewed by:	Dr Jamil Ahmad								
Language:	Urdu and Hinko where required for Local understanding and better communication								
Permeable:	Muhammad Arshad introduced the consultation team and stated the purpose of consultation. He provided a brief description of the Project. They were informed about the different sites and activities of the proposed project and there state of affairs in the proposed plan. The reservoir site, the tunnel range and other activities including information about the site of labour colony were disseminated. Later, the participants were requested to share their views on the information shared as per the Basic Information Document or if they heard anything else prior to this visit.								
No.	Issues, Concerns and Suggestions	Response by	Response Provided						
1	We need high priority in Employment opportunities in the project activities and no outsider is to be allowed to work in the project unless local human resource is accommodated to the level of local satisfaction.	Noor ur Rehman	This can be taken up as a reasonable concern.						
2	We collect wood logs from river, after tunnel formation we will deprive from this resource.	Noor ur Rehman	Point noted.						

P.3 Community Consultation Log (Female)

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Balseri Paras	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 03, 2017	
Time:	11:30 am	
Meeting Venue:	Village Balseri Paras	
Attended by and contact details:	Name	Name
	Iqra d/o Naseer U Din Qurashi	Tahzeem d/o Abdul Rashid
	Shagufta w/o Basheer UI Haq Qurashi	Sumera w/o Tanweer
	Shahnaz d/o Saddiq	Shifa w/o Rashid
	Saima w/o Sultan	Saeeda w/o Abdul jabbar
	Waseen w/o Shaukat	Gulham w/o Hamid U din Qurashi
	Nazia w/o Arif	Shanza d/o Sarfraz Ahmed
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Most of the women were not aware about the benefits of the BHPP. So their first response regarding Dam construction was very poor and they did not agree to leave their houses and lands for it. Their immediate response was that first Earthquake 2005 and floods 2010 hit them badly and destroyed their lives, houses, lands and goods. People of the area are still trying to overcome the effects of these disasters and on the other hand government is planning to construct this dam in their area. ▶ Women also added that government has no jobs for their educated and skilled youth, and now they want to destroy the business that they start by using their own resources or through taking loan. ▶ They said that Dam construction news in their area was disturbing for them and they feel fear about losing their houses, lands and goods for ever. They will not ready to leave their beautiful place and atmosphere. ▶ Women suggested if government wants to construct this dam government should select any other place without disturbing the residential settlements. ▶ Women also quoted the example of payment problem with the people of Sukhi Kinari HPP that people are not satisfied with the payments that government offered as resettlement cost. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Bararkot	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 17, 2017	
Time:	12:15 pm	
Meeting Venue:	Village Bararkot	
Attended by and contact details:	Name	Name
	Shaheena w/o Khalid	Khurshid Begum w/o Mohammad Nazir
	Saba w/o Toqeer	Shazia w/o Ayaz
	Misbah w/o Abdul Ahmed	Nusrat w/o Mohammad Faiz
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women of the affected area warmly welcomed the project team and they said they have no issue on Dam construction because it did not affect their lives directly. They said being flood affectees they are happy that water will be stored after the dam construction. ▶ They said after Dam construction electricity will be increased and load shading will be controlled in all over the country. ▶ Women told that they have benefits from river but besides that have lot of fear due to flood in the river. They fetch water, catch fish (Not often), collect fuel wood, get sand and river crush and wash clothes from river water. They also take their livestock at the bank of river for grazing and taking water. They also visit the river side in summer to get fresh air. Due to river our weather is always fresh especially during night. Nights cool even in summer. ▶ Women also feel fear about the beauty of the area because after Dam construction their green lands and fruit trees will be destroyed. ▶ There was another fear factor present in the community that if land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. ▶ People of the area also demand that local labor will be used for Dam construction on market rates. And government will provide jobs for their educated youth in this project. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Bela (part of Bella Balseri)Paras	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 2, 2017	
Time:	10:30 am	
Meeting Venue:	Village Bela	
Attended by and contact details:	Name	Name
	Khadija Zaib w/o Ahmad Nawaz	Bibi Khanfaw w/o Syed Noor Hussain Shah
	Bibi Fatima w/o Nisar Shah	Bibi Zeneet w/o Shauakat Shah
	BiBI Khurshid w/o Syed Manzoor Shah	Bibi Mahraj w/o Late Syed Nazir Shah
	Sajida w/o Syed Nazir Shah	Bibi Murtaza w/o late Nazir Hussain
	BiBi Noor Shabah w/o Syed Mohammad Hussain Shah	Yasmin w/o Asad Mohammad
	Bibi Saidoon Nisa w/o Syed Aurangzaib Shah	Nargess Bibi w/o Syed Mukhtar Shah (Polio Disabled)
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women strongly condemned for the construction of BHPP because they are also affectees of earthquakes 2005 and floods 2010. These two major incidents destroyed their lives, houses and lands. They said that they were not happy to leave their houses, land, and fruit orchards. And if government force them to leave that place then they expect not only the good price of their property but on the other hand government will also provide them the same weather, cool breeze, fresh environment that they have. ▶ People of the area also demand jobs for their educated youth and local labor used for the construction of the Dam. ▶ Women also feel fear about their children education and want batter schooling system in relocated site. ▶ There was also a major fear factor among the community that government did not fulfil their promises in land acquisition case with the mess as they have seen in other projects like Sukki Kineri. ▶ Women also said they get many benefits from river like catching fish, washing clothes, and gathering woods but after the construction of Dam they will not avail these facilities. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Badwar	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 10, 2017	
Time:	10:00 am	
Meeting Venue:	Village Badwar	
Attended by and contact details:	Name	Name
	Shahida d/o Abdul Khawar	Yasmin w/o Mohad Javid
	Samina d/o Fazal Allam	Nazneen w/o Faiz
	Shahnaz d/o Saddiq	Sumera w/o Qaddir
	Manzoor Ahmed	Hoor un Nisa
	Roqia w/o Mian Mohd Safdar	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women of the affected area expressed their unhappiness regarding Dam construction, and reluctant to reply. They said that they were not willing to leave their houses and land for any purpose or activity will be held under dam construction because river water is the main source of their livelihood like catching fishes, sand mining, wash clothes and getting woods. ▶ Most of females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business and fulfill their basic needs. Some of them earn from sewing/stitching of clothes at village level. ▶ Women said that they were not interested in cash compensation against their houses and to resettle at any other place is also impossible for them. ▶ According to the women they were not interested in relocation and they were not interested to know the benefits of the project or dam construction. ▶ Women also requested to Government, not to push them to leave their places. ▶ If land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Boli	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 10, 2017	
Time:	12:30 pm	
Meeting Venue:	Village Boli	
Attended by and contact details:	Name	Name
	Razia w/o Saeed	Khalida w/o Shabir
	Sakina w/o Aziz Ur Rehman	Rabina w/o Liaqat
	Mena w/o Shahzad	Fatima w/o Abdul Hameed
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Most of females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business and fulfill their basic needs. Some of them earn from sewing/stitching of clothes at village level. ▶ Due to Dam construction their business of dry fruit and agriculture will be destroyed, so they also want some vocational institute in their area where they resettled. ▶ Women said that Dam construction in their area is good news for them but they have some concerns on it, firstly they want free electricity in their area after Dam construction, secondly they want to live within the same village with their relatives at another place. ▶ Women also want that they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Garhi Habibullah	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 11, 2017	
Time:	10:30 am	
Meeting Venue:	Village Garhi Habibullah	
Attended by and contact details:	Name	Name
	Iram w/o Nadeem Ahmed	Anellao Mohammed Amin
	Suryia w/o Shian Mohammed	Sheza d/o Zakir
	Fazeelat w/o Mohammad Sagheer	Shazia w/o Shakeel Ahmed
	Samina d/ Tofeeq Ahmed	Zainab w/o Naseer Ahmed
	Tayyaba w/o Rizwan	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women said that Dam construction in their area is good news for them but they have some concerns on it, firstly they want free electricity in their area after Dam construction, secondly they want to live within the same village with their relatives at another place. ▶ Women also want that they must be compensated at market price so that they can relocate somewhere easily. ▶ Some educated women served as teacher in government schools, so they want same schools in their area after Dam construction to continue their jobs. ▶ Some women run dry fruit business but due to Dam construction their business of dry fruit and agriculture will be destroyed, so they also want some vocational institute in their area after Dam construction. ▶ Women said that they were interested in cash compensation against their houses and to resettle at any other place is also possible for this noble cause of Dam construction in their area. ▶ According to the women they were knows about the benefits of that project and ready to leave their places. ▶ But they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Kappi Gali	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 06, 2017	
Time:	9:30 am	
Meeting Venue:	Village Kappi Gali	
Attended by and contact details:	Name	Name
	Samina d/o Fazal Allam	Yasmin w/o Mohad Javid
	Shahnaz d/o Saddiq	Nazneen w/o Faiz
	Manzoor Ahmed	Sumera w/o Qaddir
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women told that they have benefits from river but besides that have lot of fear due to flood in the river. They fetch water, catch fish (Not often), collect fuel wood, get sand and river crush and wash clothes from river water. They also take their livestock at the bank of river for grazing and taking water. They also visit the river side in summer to get fresh air. Due to river our weather is always fresh especially during night. Nights cool even in summer. ▶ Some women run dry fruit business but due to Dam construction their business of dry fruit and agriculture will be destroyed, so they also want some vocational institute in their area after Dam construction. ▶ Women said that Dam construction in their area is good news for them but they have some concerns on it, firstly they want free electricity in their area after Dam construction, secondly they want to live within the same village with their relatives at another place. ▶ Women also want that they must be compensated at market price so that they can relocate somewhere easily. ▶ Some educated women served as teacher in government schools, so they want same schools in their area after Dam construction to continue their jobs. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Chuntian Paras	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 04, 2017	
Time:	10:00 am	
Meeting Venue:	Village Chuntian Paras	
Attended by and contact details:	Name	Name
	Abida Parveen w/o Syed Sallahdin Shah	Tohara Bibi w/o Mohammed Anwaer Shah
	Racesha Bibi w/o Mohi u Din Shah	Bibi Nyghat w/o Maroof Shah
	Bibi Naik un Nisa w/o Ghlum Gilani	Zakia Bibi w/o Sahfiq Hussain Shah
	Bibi Jammatt Un Nisa w/o Nazir Hussain Shah	Bibi Khatoon w/o Sarwar Shah
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women said that they were not happy as being the residents of Chountian due to Dam construction, they were not ready to leave their ancestor's place, because in that area they have their ancestor's grave, houses, land and fruit orchards. Women said that they did not allowed to establish BHPP colony in their settlements. ▶ Most of females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business and fulfill their basic needs. Some of them earn from sewing/stitching of clothes at village level. ▶ Women said that they were not interested in cash compensation against their houses and to resettle at any other place is also impossible for them. ▶ According to the women they were not interested in relocation and they were not interested to know the benefits of the project or dam construction. ▶ Women also requested to Government, not to push them to leave their places. ▶ If land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Dhab Paras	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 04, 2017	
Time:	12:30 pm	
Meeting Venue:	Village Dhab Paras	
Attended by and contact details:	Name	
	Sh Bibi Khursheed w/o Mukhtar Ahmad Shah	Tahira Bibi w/o Syed Awais Hussain Shah
	Naseem w/o Niamat Ullah	Fakhira Bibi w/o Syed Sabu Hussain Shah
	Zareena w/o Mohammad Saeed	Bibi Tayyaba w/o Syed Munnavar Hussain Shah
	Bibi Ghlum Dua	Bibi Zahida w/o Ghlum Ahmad Shah
	Bibi Mehr Niga w/o Late Ghlum Husain	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women of Dhub did not accept the idea of relocation cite in their settlement. They said there was no need of Dam construction, as "Sukhi Kinari" Dam was under construction close to their settlement and most of their land already acquired for sukkhi Kinari Dam. ▶ They said that local residents of Paras were not ready to leave that place at any cost because paras is the most beautiful place in Kaghan Valley. ▶ If land acquisition is unavoidable then all basic facilities like electricity, road, school, college, Masque and hospital should be provided at resettled place. ▶ They said government should provide jobs to local people on priority basics. ▶ They said as they came to know that labor camp was constructed in Dhub, they expressed their unhappiness regarding labor camp because it will create social issues due to migration of outsiders in their area. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Garan	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 04, 2017	
Time:	2:45 pm	
Meeting Venue:	Village Garan	
Attended by and contact details:	Name	Name
	Tanveer Shah (UC Member)	Mohammad Kashif
	Sara w/o Nazir Shah	Toqeer Fatima D/o Nazir Shah
	Mahfooz Bibi w/o M Tarqi Shah	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Woman said Government should provide free electricity to local communities in exchange for their support and cooperation after Dam construction. ▶ Most of females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business and fulfill their basic needs. Some of them earn from sewing/stitching of clothes at village level. ▶ Due to Dam construction their business of dry fruit and agriculture will be destroyed, so they also want some vocational institute in their area where they resettled. ▶ Women said that Dam construction in their area is good news for them but they have some concerns on it, firstly they want free electricity in their area after Dam construction, secondly they want to live within the same village with their relatives at another place. ▶ Women also want that they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Gul Dheri	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 14, 2017	
Time:	11:30	
Meeting Venue:	Village Gul Dheri	
Attended by and contact details:	Name	Name
	Abida Perveen w/o Allyas	Sadaf w/o Ibrar Ahmed
	Samina w/o Mohammad Rafiq	Safia w/o Sameer Ahmad
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women said that they have no issue about Dam construction but as Ballakot is EQ zone so it could be possibility of dam breakage due to EQ and that could be flooded out the whole Ballakot. ▶ Women said that Dam construction in their area is good news for them but they have some concerns on it, firstly they want free electricity in their area after Dam construction, secondly they want to live within the same village with their relatives at another place, thirdly jobs will be provided the locals of the area. ▶ Village Dehri Women have no direct objection regarding dam construction. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Hisari	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 12, 2017	
Time:	10:45 am	
Meeting Venue:	Village Hisari	
Attended by and contact details:	Name	Name
	Farhat w/o Shaukat Nawaz Khan	Pari
	Farah w/o Kashif Mahmood	Aribaa
	Zubaida w/o Rehman	Sabeen
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women was happy after listening about the Dam construction. They said that it did not affect their lives directly. Women said being a flood affectees they were happy that water will be stored after Dam construction and there will be lessen in floods. ▶ They said they were willing to give lands for the project but our houses should be avoided if possible. ▶ Government should provide market price for their land and fruit trees. ▶ Labor job and other jobs should be provided by the locals during Dam construction. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Talhatta	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 16, 2017	
Time:	11:30	
Meeting Venue:	Village Talhatta	
Attended by and contact details:	Name	Name
	Sakina Jann w/o Fazal	Nargas w/o Syed Sajjad Shah
	Fazeelat Bibi w/o Sarwar Shah	Zatooon Bibi w/o Ammer Ullah
	Suryia Bibi w/o Sahfaqat Shah	Nabila BiBi w/o Shaukat Hussain
	Sumera w/o Shafiq Hussain Shah	Annela w/o Asif Shah
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Woman express their happiness after listening about the Dam construction. They said that it did not affect their lives directly. Women said being a flood affectees they were happy that water will be stored after Dam construction and there will be lessen in floods. ▶ They said they were willing to give lands for the project but our houses should be avoided if possible. ▶ Government should provide market price for their land and fruit trees. ▶ Due to this project their culture will badly influenced for coming of outsider workers and foreigner. So labor and other jobs should be provided by the locals during Dam construction. ▶ On the other hand some women were not happy for dam construction in their area due to some social issue, they said they cannot work easily in the presence of outsiders and their movement will be limited to their houses only when construction work start. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Karnol	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 15, 2017	
Time:	11:30	
Meeting Venue:	Village Karnol	
Attended by and contact details:	Name	Name
	Surriya w/o Mohammad Rafiq	Samina Bibi w/o Mohammad Parvaiz
	Noreen Bibi w/o Mohammad Sajid	Zareena Bibi w/o Shah Nawaz
	Rukh Taj Bibi w/o Yaqoob	Musraat Bibi w/o Abdullah
	Mehr farooz w/o Abdul Khanan	Zarina Bibi w/o Sain
	Shahnaz Bibi w/o Mohammad Sajwal	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women was not happy after listening about the Dam construction. They said that it will affect their lives directly as more flood can come in rainy season. They expressed their fear that in case of EQ these Dams can be broken and will cause a big disaster than we already are facing every year. ▶ They said they often went at river sides for wash clothes, catch fishes and to enjoy cool breeze in summer that will be stopped after Dam construction. We also take our animals at river for grazing and drinking water that will also be affected. ▶ Due to this project their culture will badly influenced for coming of outsider workers and foreigner. So labor and other jobs should be provided by the locals during Dam construction. ▶ According to the women they were not interested in relocation and they were not interested to know the benefits of the project or dam construction. ▶ If land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Manakpai	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 07, 2017	
Time:	10:30 am	
Meeting Venue:	Village Manakpai	
Attended by and contact details:	Name	Name
	Najma w/o Rifaqat	Zatoon w/o Mirza
	Zainab w/o Abdul Rehman	Rakhtaaj Bibi w/o Shaukat
	Sakeena w/o Sher zamman	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Woman said that their houses were totally destroyed in EQ 2005, still not completed. They said that first EQ 2005 destroyed their lives, houses, lands and goods, still they are trying to overcome the effects of these disasters and now government is planning to construct this dam in their area. ▶ Women added that all the residents are relatives, belong to same family and living in close in knit also help each other in happiness and sorrows, quite helpful in grieves so they can not want to split out. Women expressed their fear that due to crushing of tunnel their houses can be affected, land slide will increase and there will be more earthquake in their area. ▶ According to the women they were not interested in relocation and they were not interested to know the benefits of the project or dam construction. ▶ If land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Shohal Mazullah
Consultation	Contact meeting with village council to start resettlement survey
Date:	May 18, 2017
Time:	11:45 am
Meeting Venue:	Village Shohal Mazullah
Attended by and contact details:	Name Sakina Jann w/o Fazal Yasmeen w/o Mohd Maskeen
Conducted by:	Rizwana Ehsan Waraich
Recorded by:	Rizwana Ehsan Waraich
Language:	Urdu and Hindko where required for Local understanding and better communication
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Woman of Muzdallah have no issue on Dam construction in their area, they said their men and youth also help out the project team in dam construction process. ▶ Woman express their happiness after listening about the Dam construction. They said that it did not affect their lives directly. Women said being a flood affectees they were happy that water will be stored after Dam construction and there will be lessen in floods. ▶ They said they were willing to give lands for the project but our houses should be avoided if possible. ▶ Government should provide market price for their land and fruit trees. ▶ Due to this project their culture will badly influenced for coming of outsider workers and foreigner. So labor and other jobs should be provided by the locals during Dam construction.

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Nihan																		
Consultation	Contact meeting with village council to start resettlement survey																		
Date:	May 02, 2017																		
Time:	01:30 pm																		
Meeting Venue:	Village Nihan																		
Attended by and contact details:	<table border="1"> <thead> <tr> <th colspan="2">Name</th> </tr> </thead> <tbody> <tr> <td>Syeda Zaneet d/o Syed Sumandar Shah</td> <td>Nasreen w/o Abdul Salam Shah</td> </tr> <tr> <td>Bibi Nasreen w/o Syed Mubark Ali Shah</td> <td>Zohra w/o Waqar Shah</td> </tr> <tr> <td>Bibi Sadiqa w/o Syed Abbas Shah</td> <td>Gull Naseem w/o Imdad Ali Shah</td> </tr> <tr> <td>Zainah w/o Syed Ummer Shah</td> <td>Bibi Safien w/o Syed Nazir Hussain Shah</td> </tr> <tr> <td>Habib un Nisa w/o Abdul Qayum</td> <td>Bibi Rehan w/o Mohammad Rafiq Shah</td> </tr> <tr> <td>Marahaba w/o Mohammad Yousaf</td> <td>Shamila w/o Syed Bilal</td> </tr> <tr> <td>Zeenat w/o Shaukat</td> <td>Tayyaba un Nisa w/o Syed Sakhi Shaha</td> </tr> <tr> <td>Shafia Bibi w/o Syed Niaz Hussain Shah</td> <td>Latif un Nisa w/o Shamas Ur Rehman Shah</td> </tr> </tbody> </table>	Name		Syeda Zaneet d/o Syed Sumandar Shah	Nasreen w/o Abdul Salam Shah	Bibi Nasreen w/o Syed Mubark Ali Shah	Zohra w/o Waqar Shah	Bibi Sadiqa w/o Syed Abbas Shah	Gull Naseem w/o Imdad Ali Shah	Zainah w/o Syed Ummer Shah	Bibi Safien w/o Syed Nazir Hussain Shah	Habib un Nisa w/o Abdul Qayum	Bibi Rehan w/o Mohammad Rafiq Shah	Marahaba w/o Mohammad Yousaf	Shamila w/o Syed Bilal	Zeenat w/o Shaukat	Tayyaba un Nisa w/o Syed Sakhi Shaha	Shafia Bibi w/o Syed Niaz Hussain Shah	Latif un Nisa w/o Shamas Ur Rehman Shah
Name																			
Syeda Zaneet d/o Syed Sumandar Shah	Nasreen w/o Abdul Salam Shah																		
Bibi Nasreen w/o Syed Mubark Ali Shah	Zohra w/o Waqar Shah																		
Bibi Sadiqa w/o Syed Abbas Shah	Gull Naseem w/o Imdad Ali Shah																		
Zainah w/o Syed Ummer Shah	Bibi Safien w/o Syed Nazir Hussain Shah																		
Habib un Nisa w/o Abdul Qayum	Bibi Rehan w/o Mohammad Rafiq Shah																		
Marahaba w/o Mohammad Yousaf	Shamila w/o Syed Bilal																		
Zeenat w/o Shaukat	Tayyaba un Nisa w/o Syed Sakhi Shaha																		
Shafia Bibi w/o Syed Niaz Hussain Shah	Latif un Nisa w/o Shamas Ur Rehman Shah																		
Conducted by:	Rizwana Ehsan Waraich																		
Recorded by:	Rizwana Ehsan Waraich																		
Language:	Urdu and Hindko where required for Local understanding and better communication																		
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women said that the construction of dam will not only disturbed and destroy their houses, agriculture and livestock system but also affect their family businesses. ▶ Women of the affected area expressed their unhappiness regarding Dam construction, and reluctant to reply. They said that they were not willing to leave their houses and land for any purpose or activity will be held under dam construction because river water is the main source of their livelihood like catching fishes, sand mining, wash clothes and getting woods. ▶ Most of the females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business and fulfill their basic needs. Some of them earn from sewing/stitching of clothes at village level. ▶ Women said that they were not interested in cash compensation against their houses and to resettle at any other place is also impossible for them. 																		

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- ▶ According to the women they were not interested in relocation and they were not interested to know the benefits of the project or dam construction.
 - ▶ Women also requested to Government, not to push them to leave their places.
 - ▶ Link between right and left bank of the river will be broken due to the submergence of the suspension bridges.
 - ▶ If land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily.
 - ▶ Due to this project their culture will be badly influenced because of outsider workers and foreigner coming to their area. So labor and other jobs should be provided to the locals during Dam construction.
 - ▶ Environmental issues will be increased due to excavation, vehicles, and operation of other heavy machinery which will be used in the project.
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Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Rahter	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 03, 2017	
Time:	12:45 pm	
Meeting Venue:	Village Rahter	
Attended by and contact details:	Name	Name
	Komal w/o Farooq Ali	Musarat w/o Aurangzaib
	Farhat Bibi w/o Abrar Shah	Ayshia w/o Khalid Shah
	Naheed Bano w/o Syed Liaquat Shah	Bibi Mah Nigar w/o Arslan Ahmed Shah
	Safia Bibi w/o Syed Mukhtar Shah	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<p>Women said that it was sad news for them to leave their houses. But if it is unavoidable than government should pay them handsome amount as compensation of their houses and land. So that they can relocate somewhere easily.</p> <p>They loved their river as they collect sand, fish, wood and cold water from it. Women replied after the construction of dam they will lose it. Water flow will be decreased after dam construction.</p> <p>Women added that while living there they fulfill their most of needs from agriculture fields with grow wheat, maize and vegetables for their whole year food.</p> <p>They said they were rearing livestock, chickens and goats that not only fulfill their dietary needs but also earn money by selling it.</p> <p>Women said they did not want to leave their places because government cannot provide them a suitable place of their choice for living and it was also not easy for them to leave their homes and lands because they have been lived on their forefathers land. Women said they were poor people and cannot afford to live in cities.</p>	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Rah Sachcha	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 05, 2017	
Time:	02:00 pm	
Meeting Venue:	Village Rah Sachcha	
Attended by and contact details:	Name	
	Sadia w/o Tauseef Shah	Gilzar w/o Yousaf saddiq
	Rukhsana w/o Mohammed Basher	Shakeela w/o Shafqat
	Najma w/o Majid Shah	Bibi Zahida w/o Ashfaq Shah
	Zeenat w/o Abid Saddiqi	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women strongly condemned the construction of BHPP and establishment of colony to resettle affected people in their residential areas and land. Their immediate response was that first EQ 2005, later Sukhi Kinari dam and now this dam disturb their lives. ▶ Women said that people of Nehaan and Bella Balseri have also their lands on mountains so they can shift there and build their houses while people of Rosaach have no alternate land so they did not want to leave their land for Dam construction. ▶ If land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. ▶ Women of the affected area expressed their unhappiness regarding Dam construction, and reluctant to reply. They said that they were not willing to leave their houses and land for any purpose or activity will be held under dam construction because river water is the main source of their livelihood like catching fishes, sand mining, wash clothes and getting woods. ▶ Women also requested to Government, not to push them to leave their places. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Sendori	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 08, 2017	
Time:	11:30	
Meeting Venue:	Village Sendori	
Attended by and contact details:	Name	Name
	Ghulam Bibi d/o Fida Hussain	Mehr Un Nisa w/o Ghlum Qaiser
	Rehmat Jan w/o Ghlum Nourani	Rehmat Bibi w/o Mohammad Hussain
	Hussain Bano w/o Ghlum Rabani	Noor un Nisa d/o Mian Jumma
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women said project construction activities would deteriorate the natural beauty of the village because after Dam construction their green lands and fruit trees will be destroyed. ▶ Some woman said they need basic amenities like any other citizen of the country i.e. Road, health, education, safe drinking water etc. ▶ They said after Dam construction electricity will be increased and load shading will be controlled in all over the country. ▶ Women told that they have benefits from river but besides that have lot of fear due to flood in the river. They fetch water, catch fish (Not often), collect fuel wood, get sand and river crush and wash clothes from river water. They also take their livestock at the bank of river for grazing and taking water. They also visit the river side in summer to get fresh air. Due to river our weather is always fresh especially during night. Nights cool even in summer. ▶ People of the area also demand that local labor will be used for Dam construction on market rates. And government will provide jobs for their educated youth in this project. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Lower Patlang	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	March 09, 2017	
Time:	11:30	
Meeting Venue:	Village Lower Patlang	
Attended by and contact details:	Name	Name
	Shanaz Begum w/o Aurangzeb	Robina w/o Babo Munsif
	Ulgat Bibi w/o Manzoor Hussain	Amber w/o Noor Hussain
	Huma w/o Ashfaq	Arifa
Conducted by:	Sadaf	
Recorded by:	Sadaf	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women expressed they were not directly affected of Dam construction. They said may be their culture and privacy disturbed due to outsider labor used by in Dam construction. ▶ Most of females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business because after Dam construction they will be limited within their houses only. ▶ They loved their river as they collect sand, fish, wood and cold water from it. Women replied after the construction of dam they can lose it. Water flow will be decreased after dam construction. ▶ According to the women they were not interested in relocation and they were not interested to know the benefits of the project or dam construction. ▶ Women have no issues with the construction of dam but they said weather will changed and become hotter and water will become dirty. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Shahotar	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 12, 2017	
Time:	10:30 am	
Meeting Venue:	Village Shahotar	
Attended by and contact details:	Name	Name
	Dilshad w/o Sartaj	Naleem w/o Zahid
	Farzan w/o Pervaiz	Sewara d/o Sartaj
	Ambrozia w/o Shahid	Areeba d/o Parwaiz
Conducted by:	Sadaf	
Recorded by:	Sadaf	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women did not express their concern on Dam construction. They said that it did not affect their lives directly. Women said that Dam construction in their area is good news for them but they have some concerns on it, they want free electricity in their area after Dam construction and they also want to live within the same village with their relatives at another place if government acquired their land and for Dam construction. ▶ Most of females, head of the households were involved in dry fruit business, agriculture and livestock rearing for livelihood. So due to Dam construction they failed to run their business and fulfill their basic needs. Some of them earn from sewing/stitching of clothes at village level. ▶ Due to Dam construction their business of dry fruit and agriculture will be destroyed, so they also want some vocational institute in their area where they resettled. ▶ Woman also demand for free electricity in their village after Dam construction. They also want high priority in employment opportunities in the project activities and no outsider allowed to work in their area. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Shohal Najaf Khan	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 11, 2017	
Time:	01:30 pm	
Meeting Venue:	Village Shohal Najaf Khan	
Attended by and contact details:	Name	Name
	Tahira w/o Manzoor	Rasheeda Bibi w/o Farooq Khan
	Naseem Akhtar w/o Late Manwar Khan	Aiman d/o Javed
	Nabila w/o Ibrar	Asma d/o Sultan
	Hashmat Bibi w/o Javed	Rehana d/o Farooq
	Zubaida w/o Sarwar Sultan	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women did not express their concern on Dam construction they were happy and they did not express any affiliation with river. They said that Dam construction will bring some positive changes in their area and problem of load shading will be solved. ▶ Women expressed they were not directly affected of Dam construction. They said they were just trying to overcome EQ 2005 effects. In this regard they take loan for the construction of the house and still unable to payed the loan back. ▶ They loved their river as they collect sand, fish, wood and cold water from it. Women replied after the construction of dam they can lose it. Water flow will be decreased after dam construction. ▶ Women added that while living there they fulfill their most of needs from agriculture fields with grow wheat, maize and vegetables for their whole year food. ▶ They said they were rearing livestock, chickens and goats business that not only fulfill their dietary needs but also they earned money by selling them. ▶ Women said after dam construction there will be less water and they will safe from flood. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Tokkol	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 06, 2017	
Time:	12:15 pm	
Meeting Venue:	Village Tokkol	
Attended by and contact details:	Name	Name
	Bibi Surya	Iqra Bibi
	Shabana	Sabin Nasa
	Shafiqa Bibi	Riffat
	Nazia	Fouzia
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Women expressed their unhappiness regarding Dam construction of BHPP because they cannot lived without river water as their livelihood is associated with the river like catching of fish, sand mining and getting wood. ▶ They said agricultural land will be affected due to increase of water level in reservoir which will affect their income. ▶ They said they have very bad experience in Sukki Kanari Dam project regarding land and houses compensation so they were requesting to treat them leniently in BHPP. ▶ Woman said land record of their area will be updated according the latest market rates. ▶ Woman said Dam construction is necessary than they expect job/labor for their men as per their qualification. ▶ Takool people have very limited land for subsistence and no one of them like to sale their land, but if land acquisition is unavoidable they must be compensated at market price so that they can relocate somewhere easily. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Tangar	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 07, 2017	
Time:	04:15 pm	
Meeting Venue:	Village Tangar	
Attended by and contact details:	Name	Designation
	Shah Jhan	Councillor
	Zenab	
	Zatoon	
	Sakina	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Tangar woman were worried due to crushing of tunnels there will be more EQ and land sliding. They shared that few days back a big land sliding occurred that frequency will increase. Due to less water in the river they have loss of getting fuel wood, sand and fishes. ▶ Only benefit of the BHPP that electricity will be produced that will decrease the load shedding they were not the direct beneficiaries so it is no special favor for them. ▶ Woman said if it is necessary than they expect job/labor for their men as per their qualification. 	

Record of the Consultation Meeting

Stakeholder/s or Settlement	Village Thobi	
Consultation	Contact meeting with village council to start resettlement survey	
Date:	May 05, 2017	
Time:	09:45 am	
Meeting Venue:	Village Thobi	
Attended by and contact details:	Name	Name
	Gulnaz w/o Mubarak Rehman	Samina w/o Mohammad Yousaf
	Samira w/o Akhter Rehman	Shazia w/o Mohammad Safdar
	Nasreen w/o Lal Hussain	
Conducted by:	Rizwana Ehsan Waraich	
Recorded by:	Rizwana Ehsan Waraich	
Language:	Urdu and Hindko where required for Local understanding and better communication	
Issues Concerns and Suggestions	<ul style="list-style-type: none"> ▶ Woman said this village has no relevance to the river but is fully dependent on spring water for drinking purpose. Both human and animals were fed through this natural resource. There was only one spring from where they have constructed their drinking water supply scheme. According to the information provided that their vital spring is definitely to be abolished. So they were unhappy about the Dam construction. ▶ Woman said that their houses were totally destroyed in EQ 2005, still not completed. They said that first EQ 2005 destroyed their lives, houses, lands and goods, still they are trying to overcome the effects of these disasters and now government is planning to construct this dam in their area. ▶ Water supply from the springs and streams may dry out as result of Dam construction. ▶ Women added that all the residents are relatives, belong to same family and living in close knit also help each other in happiness and sorrows, quite helpful in grieves so they do not want to split out. ▶ Women expressed their fear that due to crushing of tunnel their houses can be affected, land slide will increase and there will be more earthquake. ▶ They said primary occupation of their men is driving. If project require any vehicle or driver give them high priority in employment opportunities in the project activities. 	

Appendix Q: Environmental Flow Assessment Consultation

Record of the Consultation Meeting

Stakeholder/s:	Pakhtunkhwa Energy Development Organization (PEDO) Asian Development Bank (ADB) World Wide Fund for Nature-Pakistan Khyber Pakhtunkhwa (KP) Wildlife Department KP Forest Department KP Department of Fisheries Department of Environmental Sciences, University of Peshawar	
Consultation	Environmental Flow Assessment Consultation	
Date	April 10, 2017	
Time	10:00 AM to 12:00 PM	
Meeting Venue	Conference room, PEDO Office, Peshawar	
Attended By	Qayyum Zaman (QZ), GM Hydel PEDO	+92 333 9292 325
	Niamat Khan (NK), PD Balakot, PEDO	+92 333 4737 190
	Syed Kamran Hussain (KH), Manager KPK, WWF-Pakistan	+92 346 9114 366
	Zafar Ali (ZA), AD Environment, PEDO	+92 321 9876 702
	M Niaz (MN), DFO Wildlife Department, KP	+92 91 9213 112
	Suleman Khan (SK), SDFO Forest, Forest Department KP	+92 334 8568 733
	Dr Saeeda (DS), Assistant Professor, Environmental Sciences University of Peshawar	+92 91 9216 742
	Ms Shahla (MS), Lecturer, Environmental Sciences University of Peshawar	+92 91 9216 742
	Dr M. Tanveer (MT), DO Fisheries ,Fisheries Department KP	+92 303 4924 727
	Salman Shahid (SS), Project Coordinator, ADB	+92 346 9465 123
HBP Representatives	Hidayat Hasan (HH), Divisional Manager, Environmental Programs, Hagler Bailly Pakistan.	+92 300 8560 713
	Kamran Minai (KM), Environmental Specialist, Environmental Programs, Hagler Bailly Pakistan	+92 316 2988 319
	Hassan Bukhari (HB), Environmental Specialist, Environmental Programs, Hagler Bailly Pakistan.	+92 340 2466 441
	Ahmed Shoaib (AS), Fish Expert, Environmental Programs Hagler Bailly Pakistan	+92 331 4257 400

	Anusha Nisar (AU), Associate, Environmental Programs Hagler Bailly Pakistan.	+92 331 5168 884
Conducted by:	Hassan Bukhari and Hidayat Hasan	
Recorded by:	Anusha Nisar	
Reviewed by	Kamran Minai	
Language:	English and Urdu	
Preamble:	Letters were sent all stakeholders requesting their attendance for a workshop on Environmental Flow Assessment as part of the EIA of Balakot Hydropower Project. The invitees were provided with Background Information Documents (BID) which introduced and described the key aspects of the Project, in particular the environmental concerns. They were also briefly explained the purpose of Environmental Flow Assessment. The BID also provided details of the methodology being used for Environmental Flow Assessment.	

	<i>Issues/Concerns/Recommendation</i>	<i>Response</i>
MN	Asked for details and concerns about the construction activity area on the Kunhar River and the length of stretch that would be impacted. .	NK: The main road is more than 100 m above the river, where as the activity is near the river bed, therefore the activity will not affect the main road and traffic. QZ: Adit 1 is slightly different then what can be seen on the map. The level of Adit 1 is very low compared to the road. HH: New road is proposed to provide access. About a 10 km stretch of river is within the construction area.
NK	The source of construction materials should also be shown on the layout map.	HB: Noted.
ZA	What is the ratio of environment to economic weightage in the calculations in DRIFT? How does it work?	HB: DRIFT does not provide a single number for required environmental flow but rather allows stakeholders to make that decision by providing results for each scenario. NK: DRIFT is used as an optimization tool.
QZ, NK	There is a gauging station near Balakot Town and Paras bridge. Latest data from these stations and the new gauging station near the reservoir will be given to Hagler Bailly Pakistan. Flow data from gauging stations at Batakundi and Naran may also be made available. It is recommended that the latest data after 2010 be incorporated. This data will be provided by PEDO. Patrind HPP wants to digitize the Balakot gauging station. NOC has been issued by PEDO. Nullah and stream data may also be available.	Acknowledged by HBP.

	<i>Issues/Concerns/Recommendation</i>	<i>Response</i>
DS	What about the 2010 flood? The graphs do not show high flood values.	QK: the 2010 flood did not significantly impact Kunhar River.
SK	Climate Change, new seasons and fluctuations will be considered in DRIFT? In the last 5 years the hydrology of the river seems to have changed.	HH: The climate change models are not reliable. 51 year flow data is used to design dams and climate change models are incorporated in risk assessment to see the effect. Using only last 7 years data for dam design data is not sufficient.
MT	Brown Trout and Rainbow Trout are present upstream of Balakot. Rainbow Trout is more important commercially than Brown Trout. Spawning grounds for the Rainbow Trout will be affected by the Project.	Noted.
KH	Brown Trout has a commercial value and is being farmed. These can be compensated.	Noted.
MT	What is the size of reservoir for this Project?	HB: 4.5 km in length.
MT	Will there be fish ladders?	NK: Following the ADB guidelines fish ladder design is already present in the current dam design. It can be shared with the Fisheries Department.
ZA	What are the impacts on vegetation/flora and fauna other than fish? Existing pressures on forest include fuel wood collection which degrades habitat. The Project will further impact embedded flora and fauna.	HH: Ecological survey will be conducted as a part of the EIA.
DS	What are the other overall Project impacts such as impacts on the migratory birds?	HH: Project impact assessment will be conducted as part of the EIA. These concerns will be addressed in separate public consultations. QK: Public consultation is going on. The EIA will be made available to the public when it is approved by EPA-KP.
SK	Will there be any road relocation as was required for Sukki Kinari HPP? Upstream of Paras the Forest area is reserved.	NK: The existing road level is higher than the flood plain. It is estimated that only 1 km will be submerged.
MN	Will this project consider benefits like REDD+ and carbon credit? Are there any schemes to limit or prevent fuel wood collection?	NK: Royalty of 10% of the revenue will be given to the district where the Project is located. The funds that can be utilized for such schemes. These schemes will be designed and considered by the local government.

	<i>Issues/Concerns/Recommendation</i>	<i>Response</i>
MN	What about the socioeconomic issues?	<p>HH: Socioeconomic impacts are a part of the EIA study and will be carefully evaluated.</p> <p>NK: Due to this development hospitals, schools and tourism will increase hence benefiting the local area. Local labor will be utilized during the construction phase. This will help improve the economic growth of the area.</p>
MN	Will the consultation be held with the head of the department or local office?	<p>QK: The procedure is to inform the head of the department. If the head of the department wants to include the local office then we will do so.</p>

Record of the Consultation Meeting (Draft)

Stakeholder/s:	Pakhtunkhwa Energy Development Organization (PEDO) Asian Development Bank (ADB) Khyber Pakhtunkhwa (KP) Environmental Protection Agency World Wide Fund for Nature-Pakistan KP Wildlife Department KP Forest Department KP Department of Fisheries Department of Environmental Sciences, University of Peshawar Livestock and Dairy Development	
Consultation	Environmental Flow Assessment Consultation	
Date	June 1, 2017	
Time	11:00 AM to 1:00 PM	
Meeting Venue	Conference room, PEDO Office, Peshawar	
Attended By	Qayyum Zaman (QZ), GM Hydel PEDO	+92 333 9292 325
	Wajid Khan (WK), Assistant Director, Environmental Protection Agency, Peshawar	+91 921 0263
	Syed Kamran Hussain (KH), Manager KPK, WWF-Pakistan	+92 346 9114 366
	Zafar Ali (ZA), AD Environment, PEDO	+92 321 9876 702
	Safdar Ali Shah (SA), Chief Conservator, Wildlife Department, KP	+92 333 5040 664
	Muhammad Arif (MA), SDFO Forest, Forest Department KP	+92 340 9893 958
	Dr Saeeda (DS), Assistant Professor, Environmental Sciences University of Peshawar	+92 91 9216 742
	Mohammad Diyar (MD), Director Fisheries, Fisheries Department KP	+92 0302 2984 680
	Salman Shahid (SS), Project Coordinator, ADB	+92 346 9465 123
	Dr. Qazi Zia-ur-Rehman (QR), Senior Veterinary Officer, Directorate General (Extension), Livestock and Dairy Development	+92 333 9121 644
HBP Representatives	Vaqar Zakaria (VZ), Managing Director, Hagler Bailly Pakistan.	+92 300 8560 713
	Buland Akhtar Siddiqui (BA), Information Technology Consultant, Hagler Bailly Pakistan	+92 346 5364 000
Conducted by:	Vaqar Zakaria	
Recorded by:	Buland Akhtar Siddiqui	
Reviewed by	Kamran Minai	
Language:	English and Urdu	

Preamble:	The process of EFlow assessment was described, and the results of the EFlow assessment were shared with the participants. The behaviors of different fish species and how they are likely to be impacted by the Project was described. Recommendations for alternatives available for management of the project operations to minimize the impact on aquatic fauna were presented. Pressures on the river system including fishing and sediment mining, and disposal of urban effluents and solid waste into the river were described. The strategy for management of biodiversity developed for BAP the Gulpur HPP and subsequently adopted in the BAP/MP of Karot and Kohala HPPs was described, and it was suggested that the approach that has been tested in implementation of BAP of Gulpur HPP should be adopted. This includes a watch and ward protection of the river, sustainable management of sand and gravel mining, a watershed management program, and research on aquatic biodiversity.
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	<i>Issues/Concerns/Recommendation</i>	<i>Response</i>
QZ	It may be challenging to operate the power house on baseload as Sukki Kinari HPP will be a peaking operation. The technical feasibility of a baseload operation will have to be investigated.	VZ: This aspect has to be taken into account in the design of the dam. Patrind HPP has been designed for a baseload operation, and it was designed to take peaking releases from SKHPP
MD	Cumulative impacts of HPPs are a serious concern, how will these be addressed	VZ: A cumulative impact assessment is part of the EIA. The approach suggested in the CIA of Kohala HPP is suggested to be followed. The basin wide impacts have been studied at a high level in the IFC sponsored Hydropower Strategy for the Jhelum-Poonch Basin, the second phase of which is to start soon. The stakeholders in KP will be kept informed and will be contacted for participation by IFC in the course of implementation of the second phase of the basin-wide initiative.
MD	Will it be possible to construct a fish ladder?	VZ: Given the dam height of the order of over 60 meters, it will not be technically feasible to construct a fish ladder. Genetic studies and physical transport of fish from downstream to upstream of the dam will be recommended of genetic studies show impacts of isolation.

Appendix R: EFlow Presentations

See following pages.

Balakot Hydropower Project

Stakeholder Consultation for Environmental Flow Assessment

Asian Development Bank

April 10, 2017

 **Hagler Bailly** Pakistan



Agenda

- 10:00 to 10:15 Introduction of Participants and Agenda
- 10:15 to 10:30 Introduction to the Project and Scope of the ESIA
- 10:30 to 11:15
 - Baseline hydrology of the Kunhar River
 - Baseline ecology of the Kunhar River
 - Introduction of EFlow Assessment methodology (DRIFT)
 - Representative sites and indicators selected for impact assessment
 - EFlow assessment scenarios under consideration for impact assessment
- 11:15 to 11:30 Sharing of concerns, questions and discussion

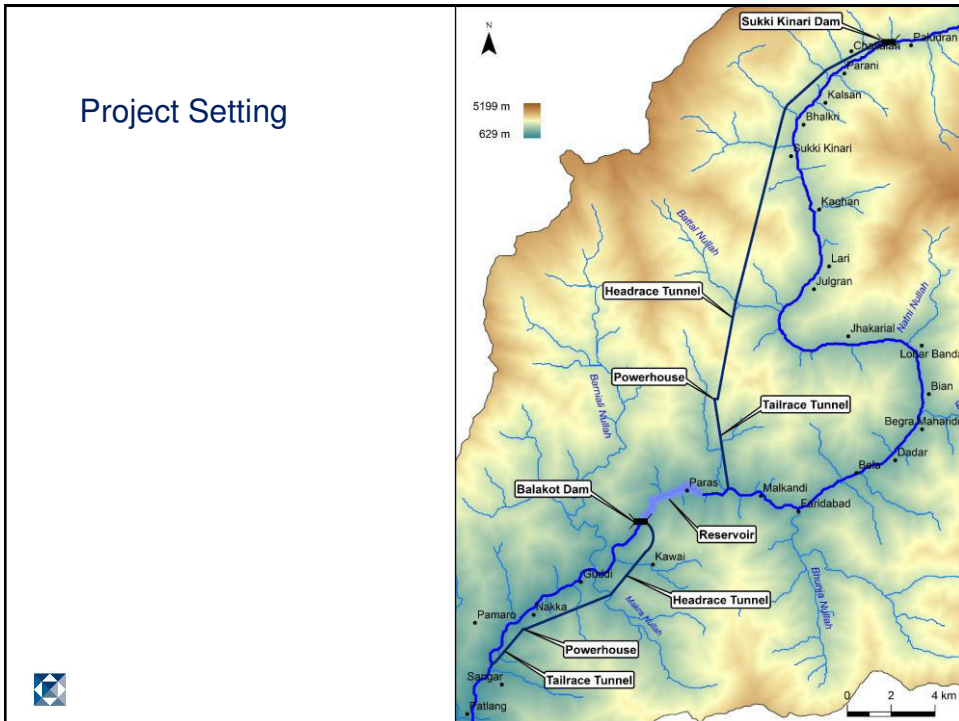
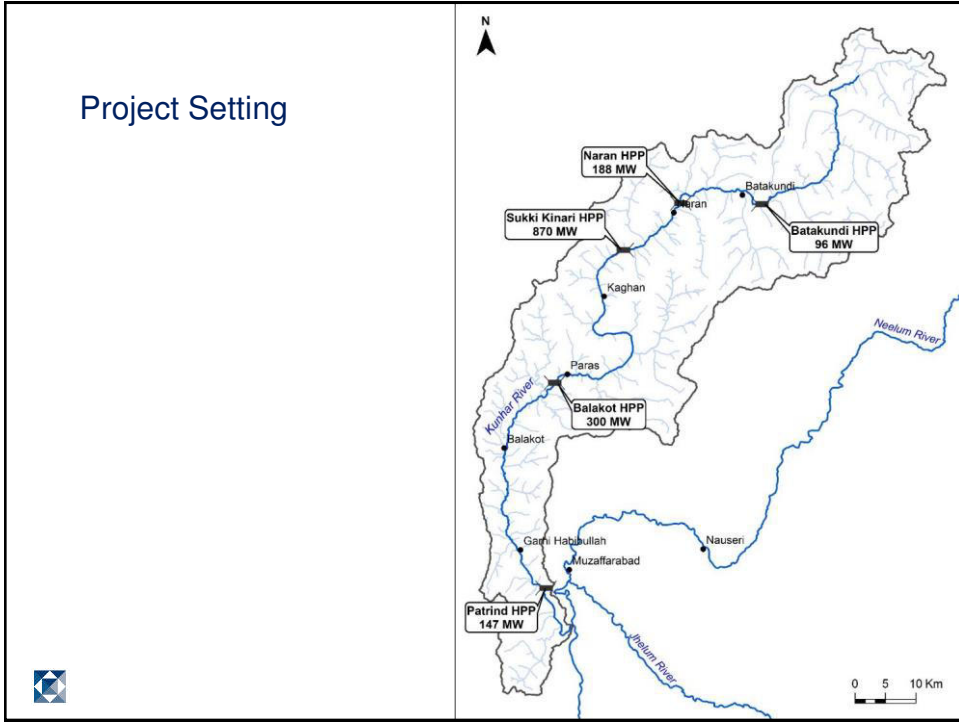


Introduction of Participants



Introduction to the Project





River at Paras (Reservoir)



Near Dam Site



Near Dam Site



Dhamdar Village



Guddi Village



Powerhouse Site



Balakot Town



Bissian Village



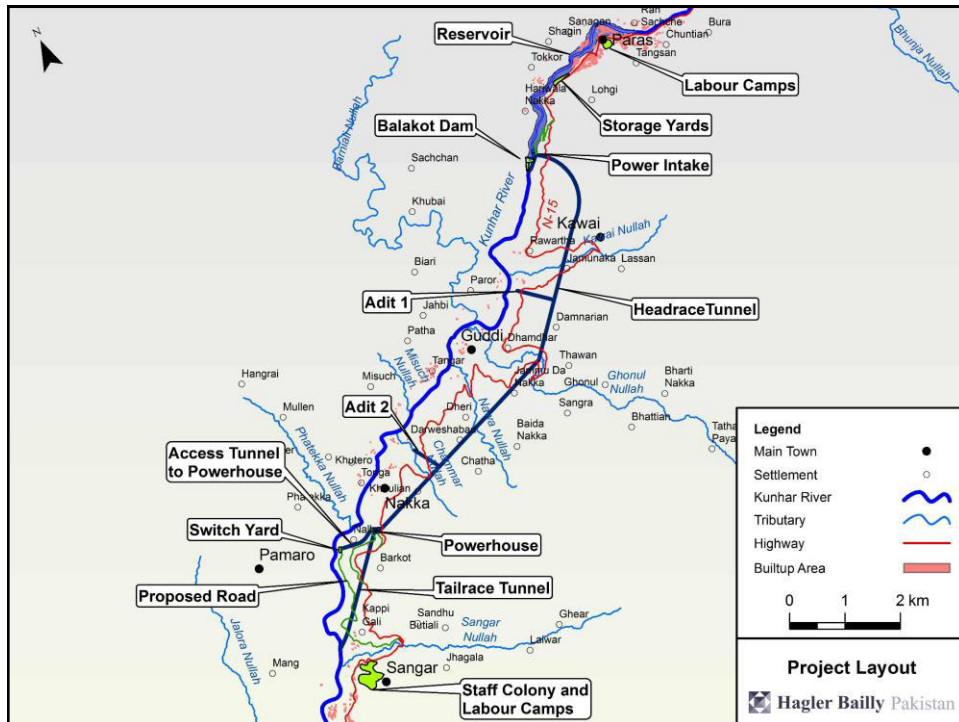
Badna Village



Project Layout

- Installed capacity: 300 MW
- Annual energy output: 1,187 GWh
- Design discharge: 154 m³/s
- Dam height: 78 m above river bed
- Reservoir
 - Storage: 2.566 million m³
 - Area: 0.555 km²
 - Length: 4,500 m
- Diversion Tunnel
 - Headrace tunnel length: 8,420 m
 - Tailrace tunnel length: 2,075 m





Scope of the ESIA

The major components of the study include:

- baseline studies to characterize the existing environment in the project area;
- a public consultation process to ensure that project stakeholders are informed of the project development plan and have an opportunity to influence it;
- an analysis of the physical, ecological and socioeconomic impacts of the project, both negative and positive; and
- suggested mitigation measures to address the identified adverse impacts.



Environmental Flow (EFlow)

The quantity, timing and quality of the flow of water, sediment and biota necessary to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems

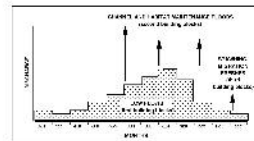
Amended from Brisbane Declaration (2007)



EFlows Assessment Methods

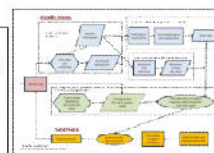
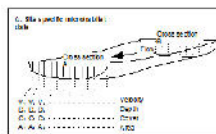
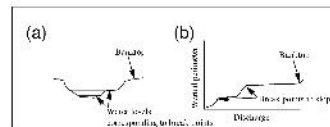
- Over 300 methods
- Simple ones from 1970s to more modern holistic methods

METHOD	Recommended percentage of flow ¹	
	ENVIRONMENTAL	ADDITIONAL
Hydrological modelling (flow)	20-40%	10-20%
Substratum type of flow	20-40%	10-20%
Hydrological modelling (sediment transport)	20-40%	10-20%
Substratum type	20-40%	10-20%
Channel	20-40%	10-20%
Flow	20-40%	10-20%
Flow or frequency	20-40%	10-20%
Flow or duration	20-40%	10-20%
Flow or duration	20-40%	10-20%
Flow or duration	20-40%	10-20%



Traditional classification:

- hydrological
- Hydraulic rating
- Habitat simulation
- Holistic



EFlows Assessment Methods

- **Hydrological methods** use summary statistics from hydrological data, e.g., percentile from the annual flow duration curve, or the lowest recorded flow. Set 'minimum flow' for the river.
- **Hydraulic-rating methods** use simple hydraulic variables, e.g., wetted perimeter or depth, as surrogates for ecological data or habitat, and predict how these change with changes in discharge.
- **Habitat-simulation techniques** measure the most-commonly used hydraulic habitat of indicator species and then model how much of this habitat would be available over a range of flows.



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EFlows Assessment Methods (Contd.)

- **Holistic methodologies** address the condition of most/whole river ecosystem, including individual species or guilds in the channel, the riparian zones, floodplains and estuary where relevant; and linked societal-resource-economic issues.



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Introduction to DRIFT

- Downstream Response to Instream Flow Transformations
- Holistic method
- Developed by Southern Waters
- Used extensively in the Jhelum Basin such as
 - Gulpur Hydropower Project
 - Karot Hydropower Project
 - Kohala Hydropower Project
 - Kishenganga Hydropower Project



Location of applications

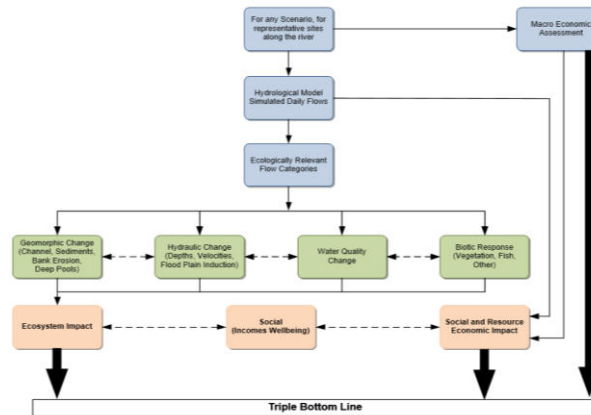


c. 50 projects in total

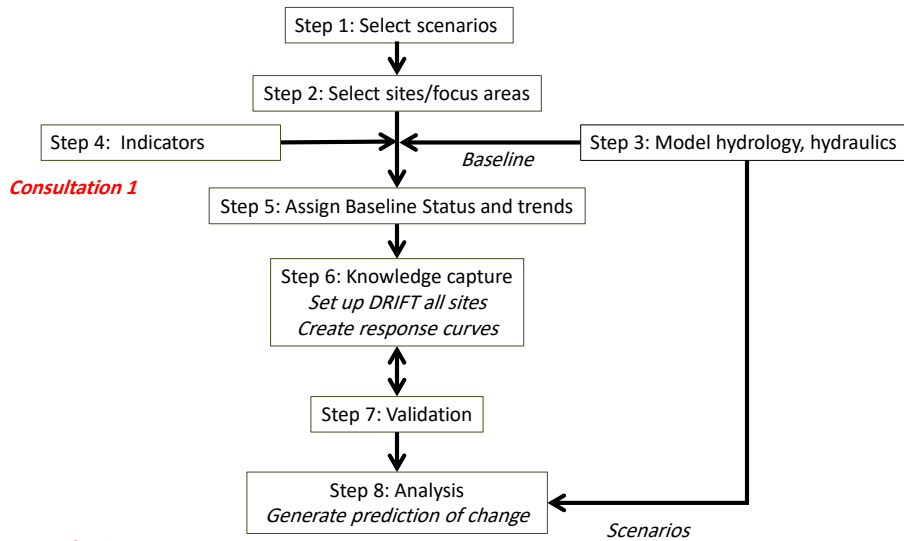


DRIFT Methodology

- Uses a combination of data, knowledge and experience to predict how the river ecosystem will change

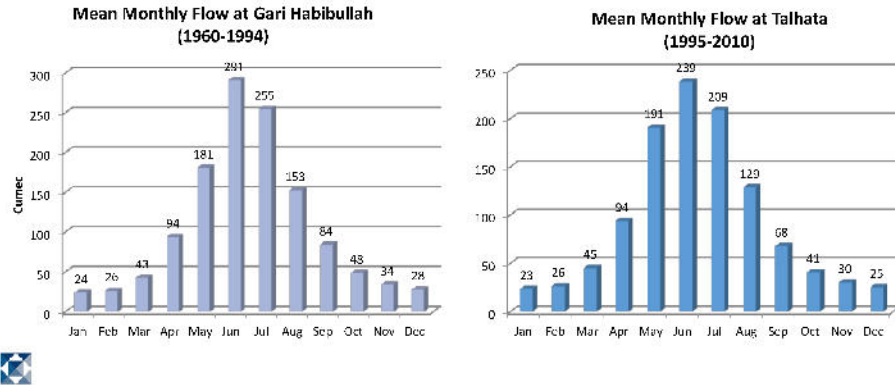


Generic steps in DRIFT



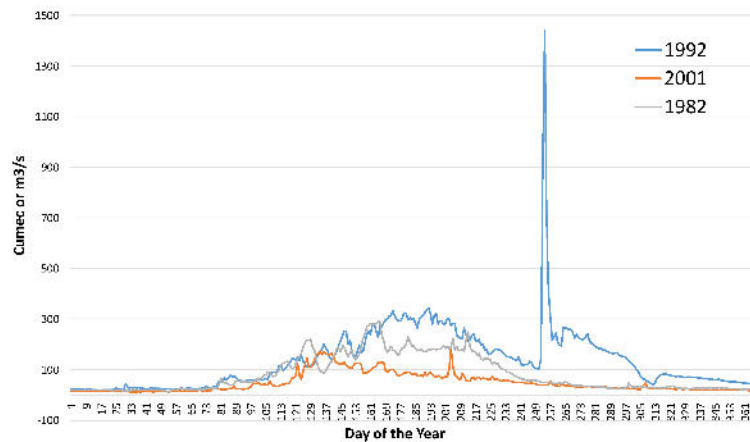
Baseline Hydrology (Kunhar River)

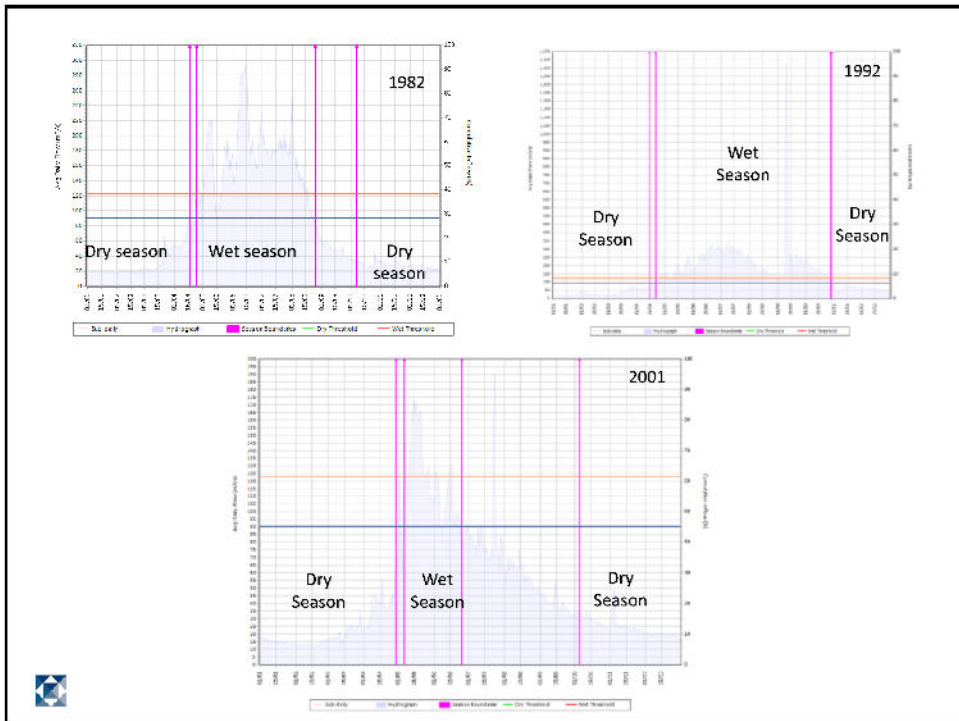
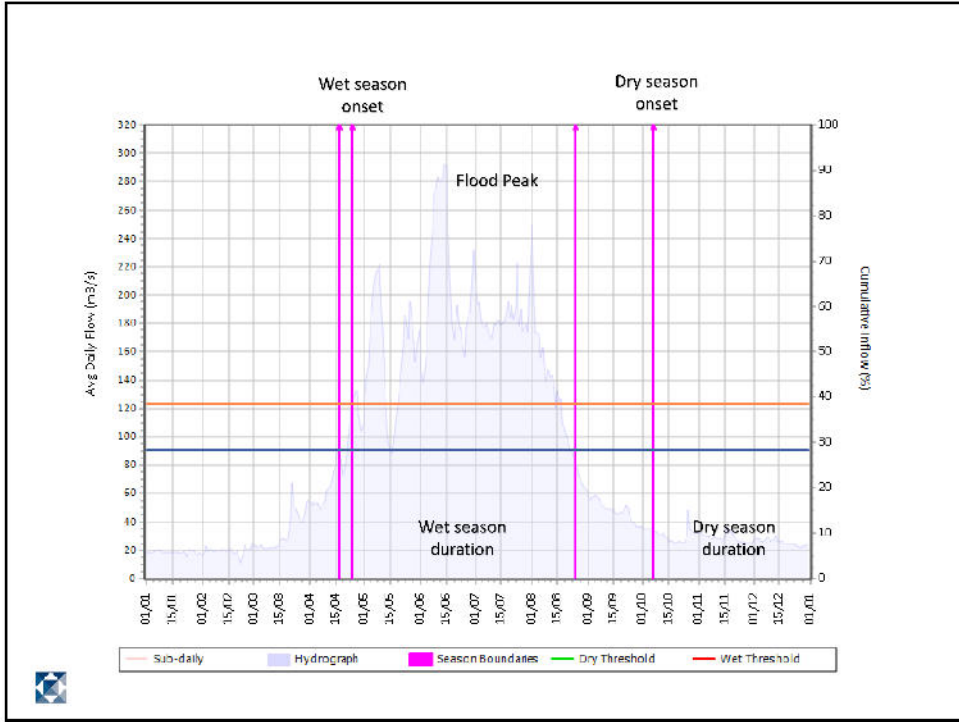
- Data from Garhi Habibullah gauging station (1960-1994)
- Data from Talhatta gauging station (1995-2010)

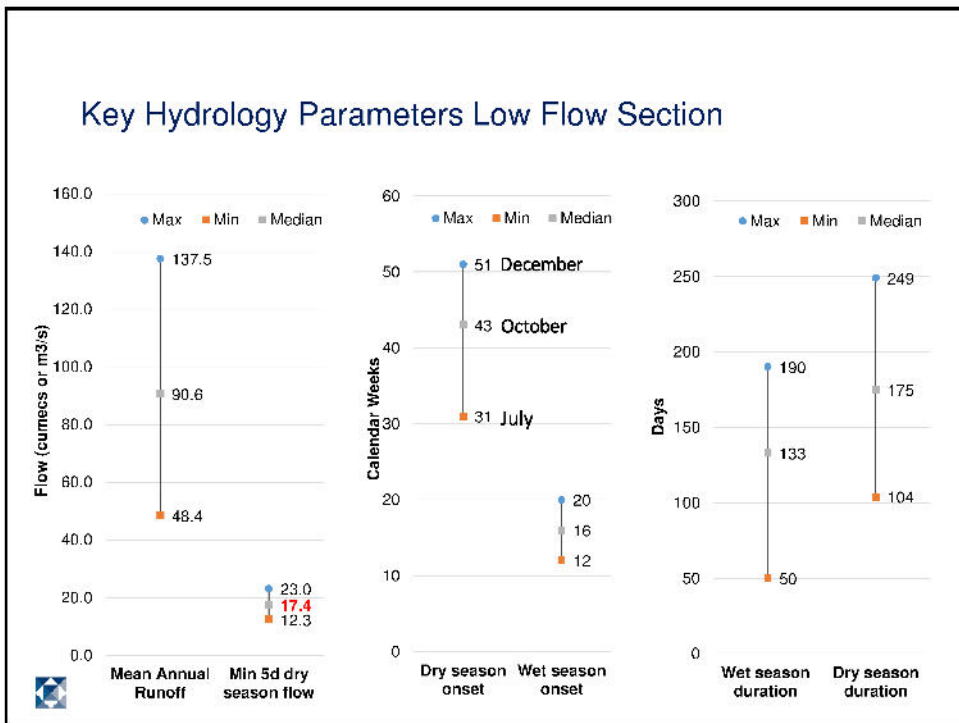
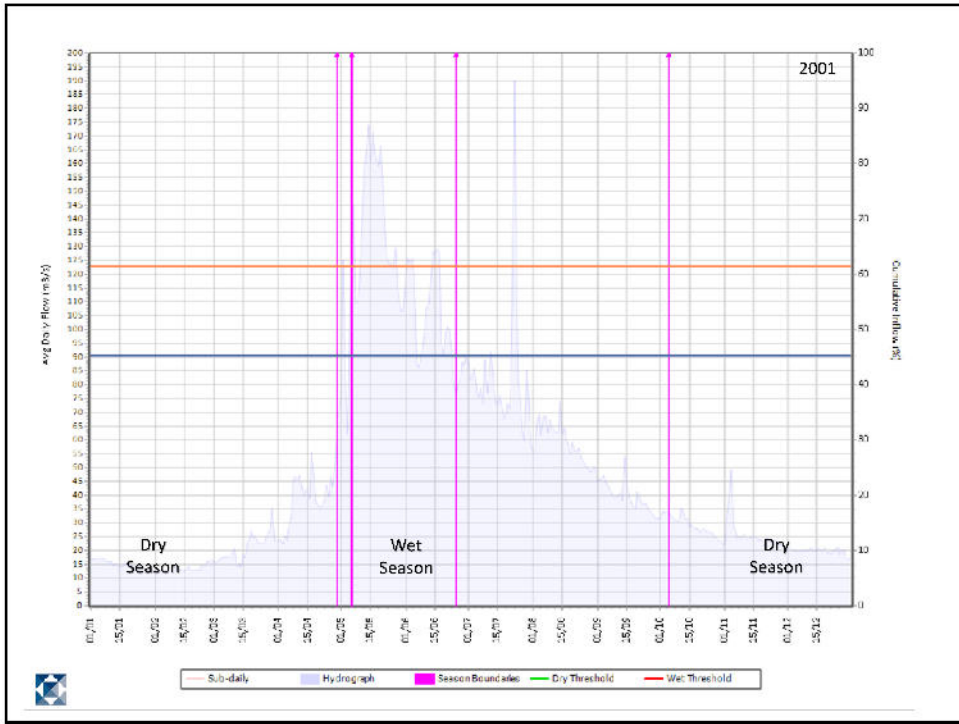


Kunhar River Hydrograph

- 51 year daily data







Selected Scenarios

- 51 year (1960 – 2010) Median Min 5 day flow is **17.4 m³/s**
- Eflow scenario based on percentage of Min 5 day flow
- The following scenarios are proposed:

Percent of Min 5 day flow	Environmental Flow Scenarios
~10%	1.5 m ³ /s as in Balakot Feasibility and 2 m ³ /s used for Patrind HPP
20%	3.5 m ³ /s
35%	6.1 m ³ /s
50%	8.7 m ³ /s



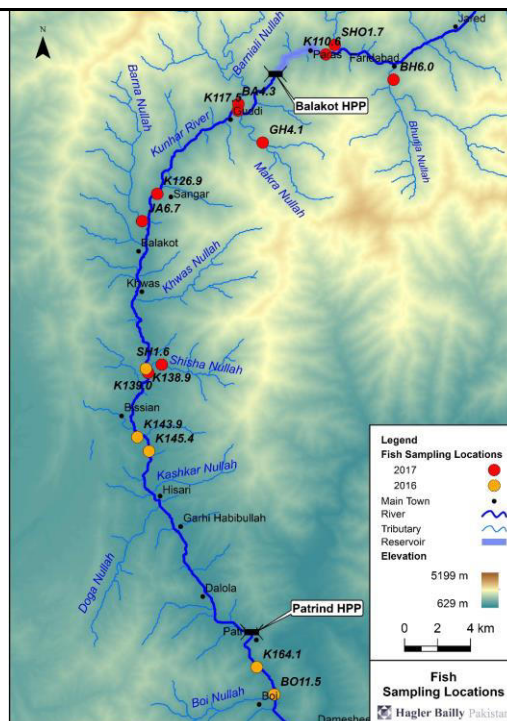
Baseline Ecology

Fish surveys conducted in

- Summer (July 2016)
- Winter (February 2017)
- Summer (Planned 2017)

Fish sampling methods

- Cast Net
- Electrofishing
- Gill Net



Cast Net



Electrofishing



Gill net



Release after capture



Fish Indicator Selection

No	Scientific Name	Common Name	16-Jul	17-Feb	IUCN Status	Migratory	Endemic	Selected Indicators
1a	<i>Schizothorax richardsonii</i>	Alwan Snow Trout	68	102	Vulnerable			
1b	<i>Schizothorax labiatus</i>	Kunar Trout	-	-	Not Assessed			
2a	<i>Schistura nalbanti</i>	Nalbant's Loach	35	19	Not Assessed			
2b	<i>Schistura alepidota</i>		6	8	Not Assessed			
2c	<i>Schistura arifi</i>	Arif's Loach	-	2	Not Assessed			
3	<i>Triplophysa kashmirensis</i>	Kashmir Hillstream Loach	57	8	Not Assessed			
4	<i>Glyptosternum reticulatm</i>	Himalayan Catfish	-	5	Not Assessed			
5	<i>Onchrychus mykiss</i>	Rainbow Trout	-	-	Not Assessed			
6	<i>Salmo trutta fario</i>	Brown Trout	-	11	Not Assessed			

Notes:

Alwan Snow Trout acts as proxy for Kunhar Trout
Schistura have similar behavior



Selected Fish Indicators

- Alwan Snow Trout
- Nalbant's Loach
- Kashmir Hillstream Loach
- Himalayan Catfish
- Rainbow Trout



Alwan Snow Trout

Schizothorax richardsonii



Nalbant's Loach

Schistura nalbanti



Kashmir Hillstream Loach

Trilpophysa kashmirensis



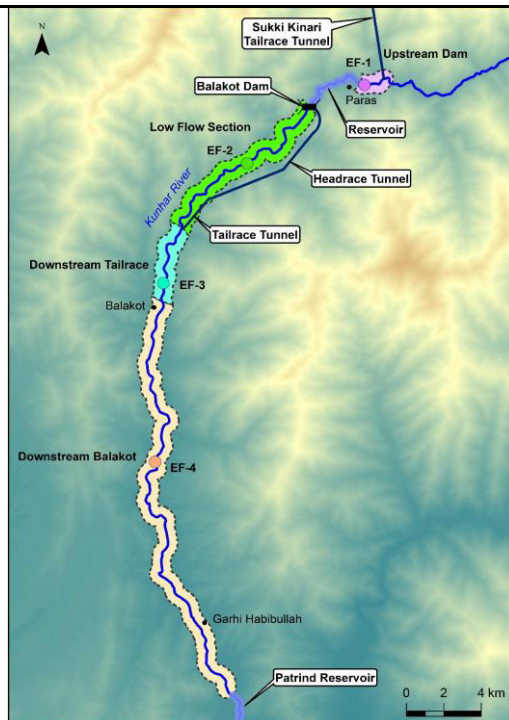
Himalayan Catfish

Glyptosternum reticulatm



Selected Sites

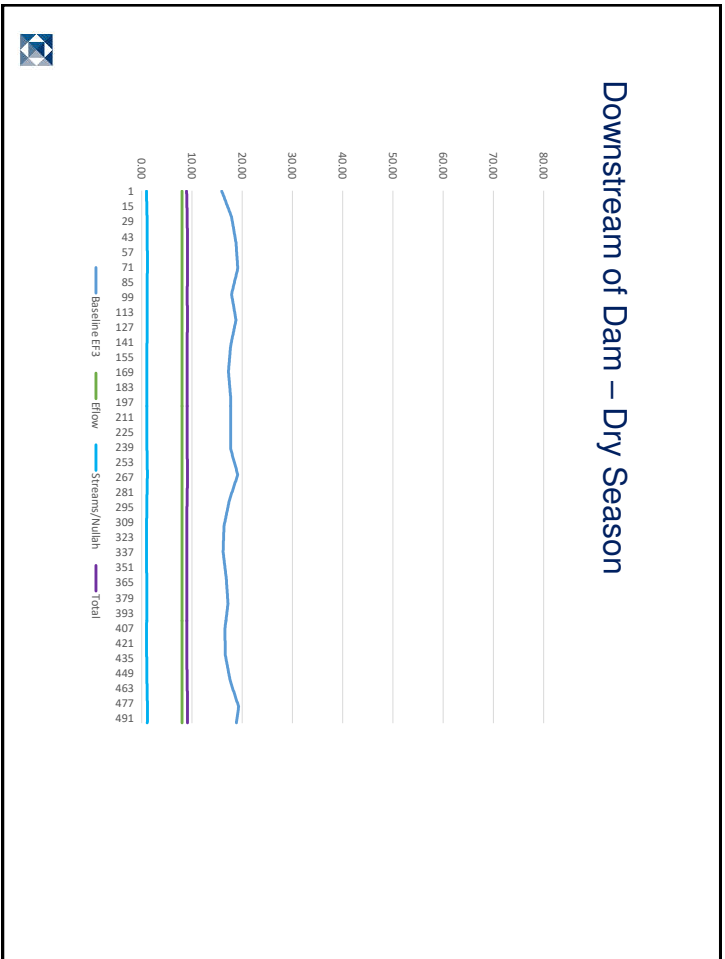
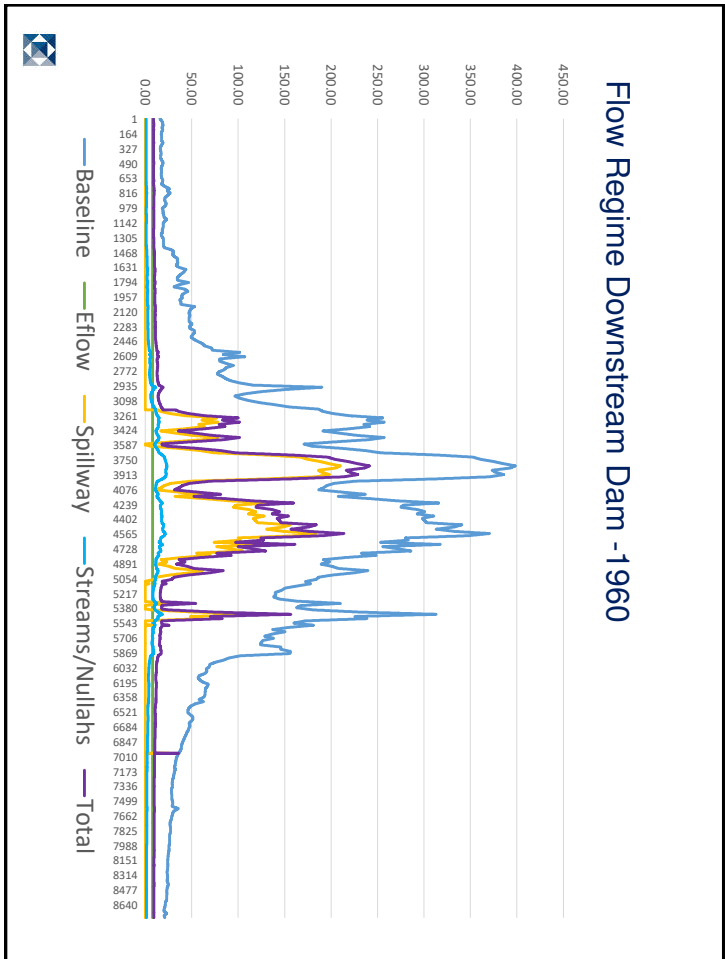
- EF-1: Upstream Dam
 - From Sukki Kinari Tailrace Tunnel to Balakot Reservoir
- EF-2: Low Flow Section
 - From Balakot Dam to Tailrace
- EF-3: Downstream Tailrace
 - From Tailrace to Balakot Town
- EF-4 Downstream Balakot
 - From Balakot Town to Patrind Reservoir



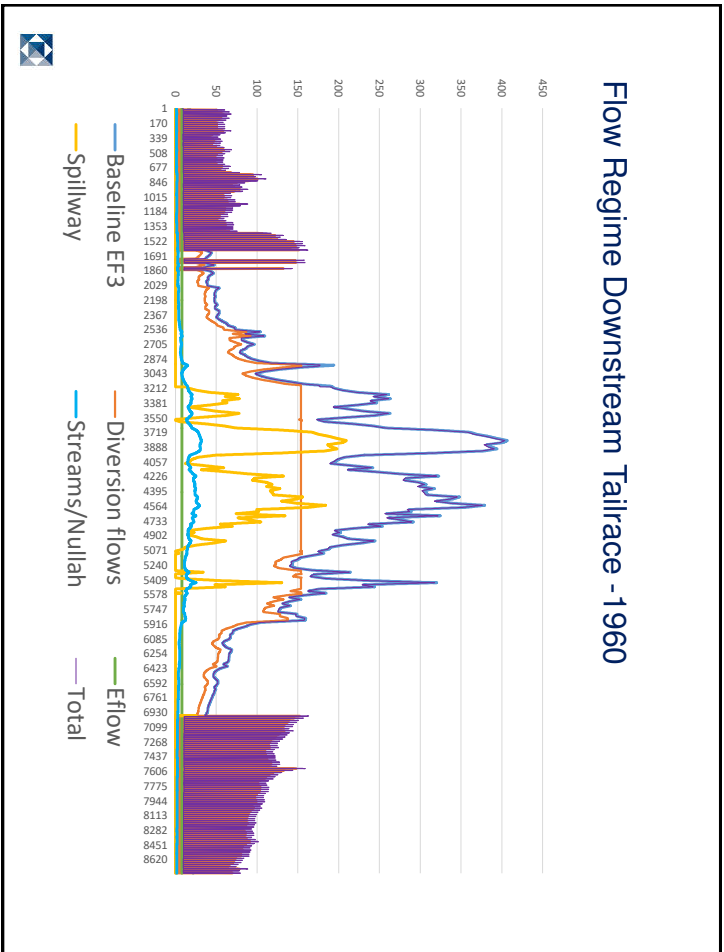
Dam Operating Rules

- Calculations performed based on following peaking rules
 - Peaking time is from 6 pm to 10 pm
 - Peaking storage is available for 4 hours of peaking at 154 m³/s
 - Average daily flow less than 25.6 m³/s meets this requirement and the HPP will peak
 - For average daily flows greater than 25.6 m³/s the HPP will operate on baseload or as true run of river

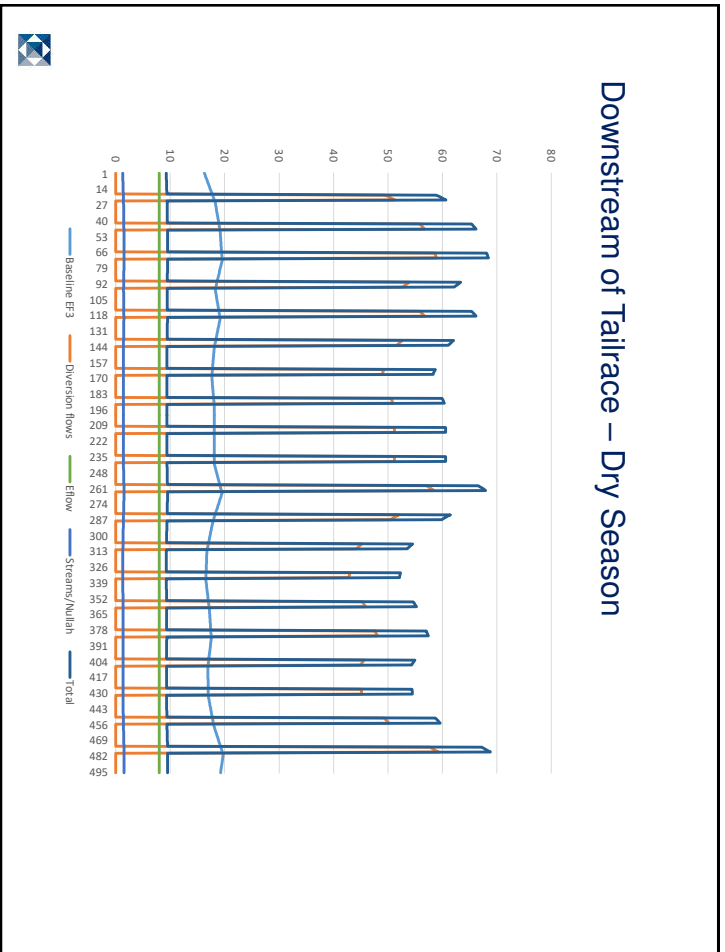




Flow Regime Downstream Tailrace - 1960



Downstream of Tailrace – Dry Season



Conclusions and Recap

- Baseline hydrology and ecology was discussed
- Selected Fish indicators for impact assessment are:
 - Alwan Snow Trout
 - Nalbant's Loach
 - Kashmir Hillstream Loach
 - Himalayan Catfish
 - Rainbow Trout
- Selected scenarios for impact assessment are:

Percent of Min 5 day flow	Environmental Flow Scenarios
~10%	1.5 - 2 m ³ /s
20%	3.5 m ³ /s
35%	6.1 m ³ /s
50%	8.7 m ³ /s



Sharing of concerns, questions and discussion

hbukhari@haglerbailly.com.pk

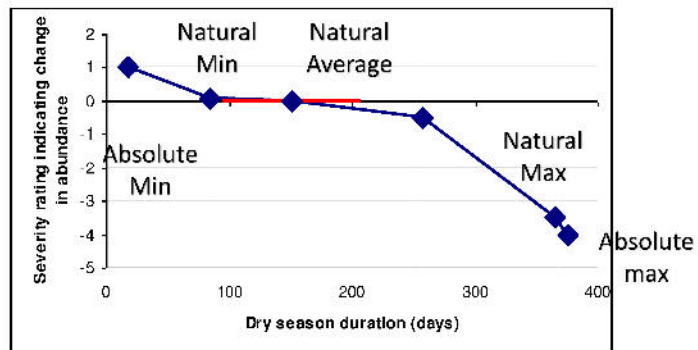
+92 (340) 2466 441



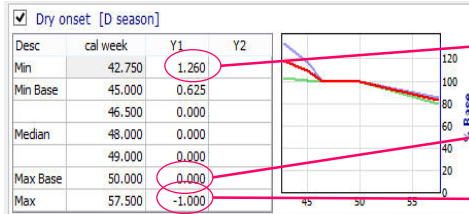
Appendix



Response Curves



Example



6 weeks earlier median
c. 15% increase

2 weeks later median
No change

10 weeks later median
c. 15% decrease



Environmental Impact Assessment (EIA) for Balakot Hydropower Project

Asian Development Bank

June 1, 2017

 **Hagler Bailly** Pakistan

Overview

- Ecological Baseline
- Results of the EFlow Assessment
- Management of Pressures



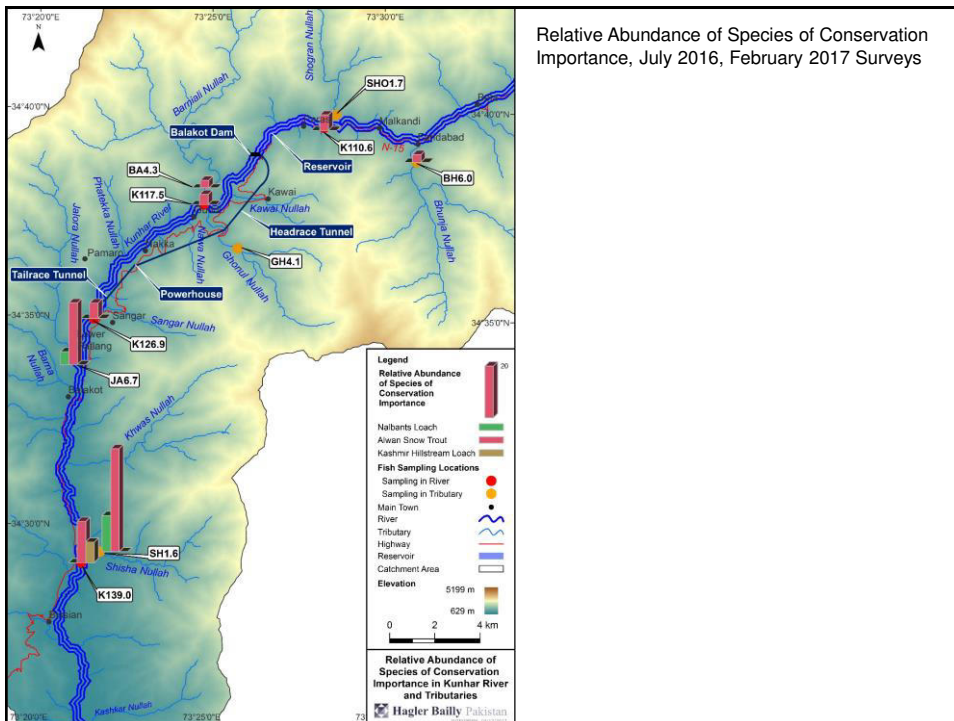
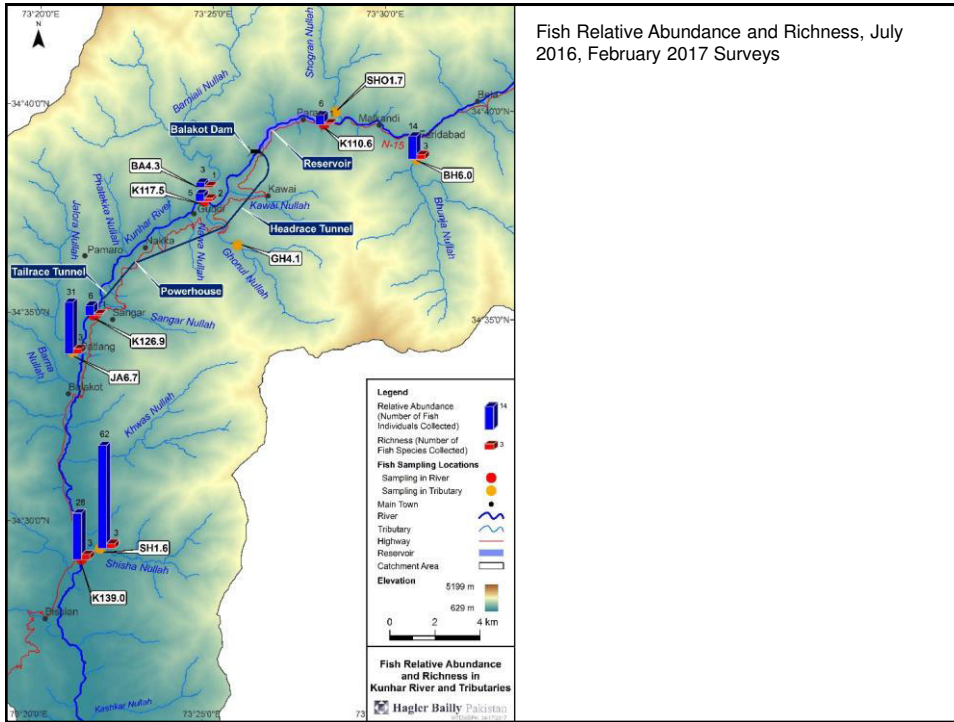
Ecological Baseline

Ecology Baseline – Fish Fauna

Fish Fauna Recorded from Study Area in Kunhar River and Tributaries, July 2016, February and May 2017 Surveys

No.	Scientific Name	Common Name	IUCN Status	Endemic	Migratory
1.	<i>Glyptosternum reticulatum</i>	Himalayan Catfish	Not Assessed		
2.	<i>Oncorhynchus mykiss</i>	Rainbow Trout	Not Assessed		
3.	<i>Schistura alepidota</i>	Stone Barb	Not Assessed		
4.	<i>Schistura arifi</i>	Arif's Loach	Not Assessed		
5.	<i>Schistura nalbanti</i>	Nalbant's Loach	Not Assessed	✓	
6.	<i>Schizothorax richardsonii</i>	Alwan Snow Trout	Vulnerable		✓
7.	<i>Triplophysa kashmirensis</i>	Kashmir Hillstream Loach	Not Assessed	✓	
8.	<i>Glyptothorax pectinopterus</i>	Flathead Catfish	Not Assessed		
9.	<i>Salmo trutta fario</i>	Brown Trout	Not Assessed		





Behavior Table – Nalbant's Loach

Preferences for Flow Dependent Habitat, Breeding, and Movement of the *Schistura nalbanti*

	Adults	Juveniles	Spawning
Depth of Water	Banks, shallow riffles (<0.5 m)	Shallow side pools (<0.5 m)	Shallow side channels and pools (<0.30 m)
Velocity	Low to moderate (0–2 m/s)	Low to moderate (0–2 m/s)	Low to moderate (0–2 m/s)
Habitat	Pools, riffles, glides	Banks	Pools, riffles
Substrate	Rocky, stony	Cobbles	Stones, cobbles
Temperature	8 – 20 °C	10 – 20 °C	10 – 20 °C
Dissolved O2	6 – 8 mg/l	6 – 8 mg/l	6 – 8 mg/l
Food	Earthworms, larvae, slime	Micro-invertebrates	–
Spawning Period	June – August		
Breeding Period and Trigger	May – August in the Flood Season. Breeding is triggered by rise in temperature after the Dry Season. Breeds both in river as well as in tributaries in suitable habitat.		
Movement Pattern	Does not show any significant movement except for breeding, when it moves to shallow side pools.		
Movement Triggers	Rise in water temperature, swollen river and expansion of habitat.		
Other Flow-related Needs	Is sensitive to pollution.		



Behavior Table – Nalbant's Loach

Annual Cycle of Breeding and Growth of the *Schistura nalbanti*

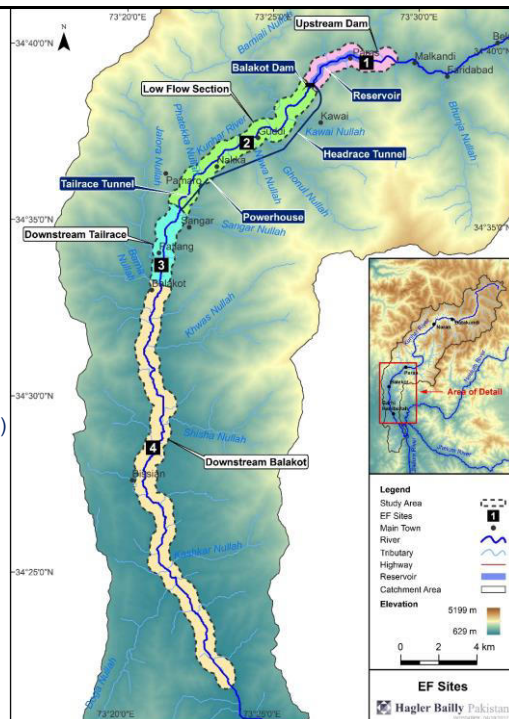
Months	Flow Conditions	Fish Behavior
June – August	Flood Season	Breeding is triggered by snow melt and rise in turbidity. Fish move to breeding grounds in shallow side pools, and channels of the river with cobbles and gravely beds. Eggs hatch in this season, and fries and fingerlings remain in shallow waters in side channels.
September – October	Transition–2 and Dry Onset	Spent fish move to banks of the mainstream. Fingerlings remain in shallow side channels. Both adult and young fish feed actively in this period.
November – March	Dry Season	Fish move mainly to crevices for overwintering. Food intake drops significantly as fish is inactive and also utilizes fat reserves for survival.
April – May	Transition–1 and Flood Season	Fish emerge and move to banks, avoiding fast flows, in search of food to get ready for the breeding season.



EFlow Assessment

River Segments

- EF 1: Upstream Dam
 - Reservoir (4.5 km)
- EF 2: Dam to Tailrace
 - Low flow section (15.4 km)
- EF 3: Tailrace to Balakot Town
 - Peaking section (4.7 km)
- EF4: Balakot Town to Patrind HPP
 - Attenuated Peaking section (20.9 km)



Protection Scenarios

- Business as Usual or No Protection (**NP**) = increase pressures in line with present trends, i.e. pressures double in intensity over the next fifty years.
- Low Protection (**LP**) = maintain present pressure levels on the river
- Medium Protection (**MP**) = reduce levels of pressures by 50%
- High Protection (**HP**) = reduce levels of pressures by 90%

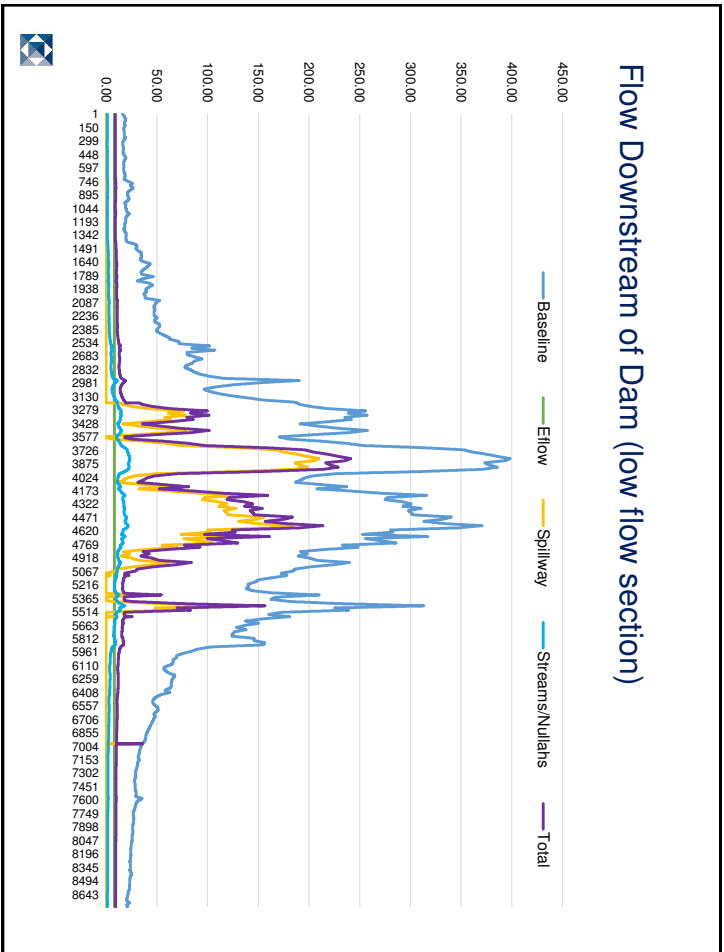


Flow Scenarios

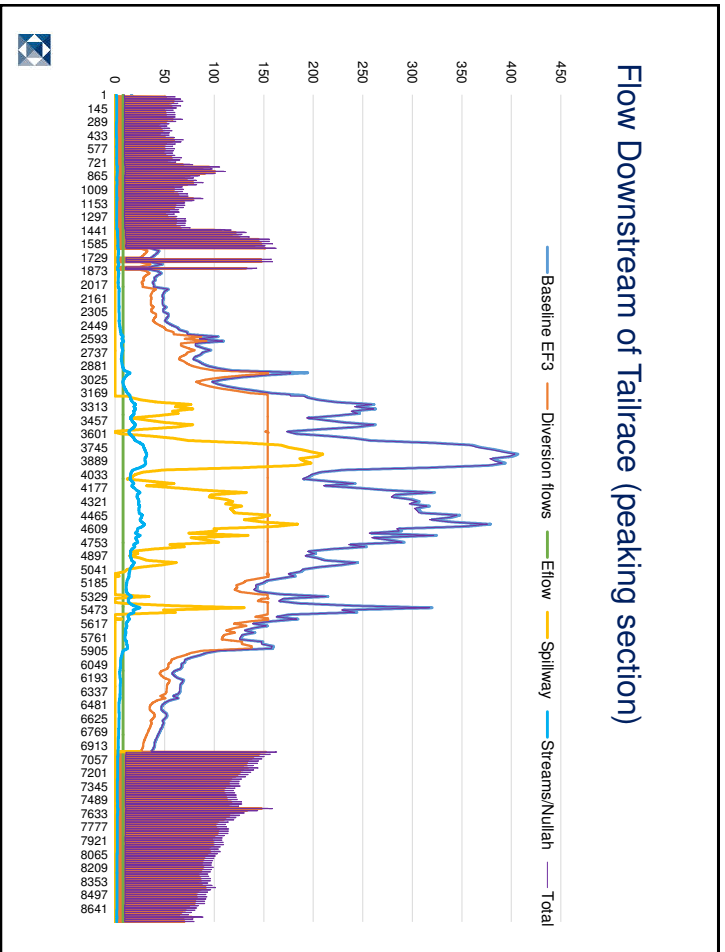
- Environmental Flows
 - 1.5 m³/s
 - 3.5 m³/s
 - 4.5 m³/s
 - 6.1 m³/s
 - 8.7 m³/s
- Baseload and Peaking Scenarios



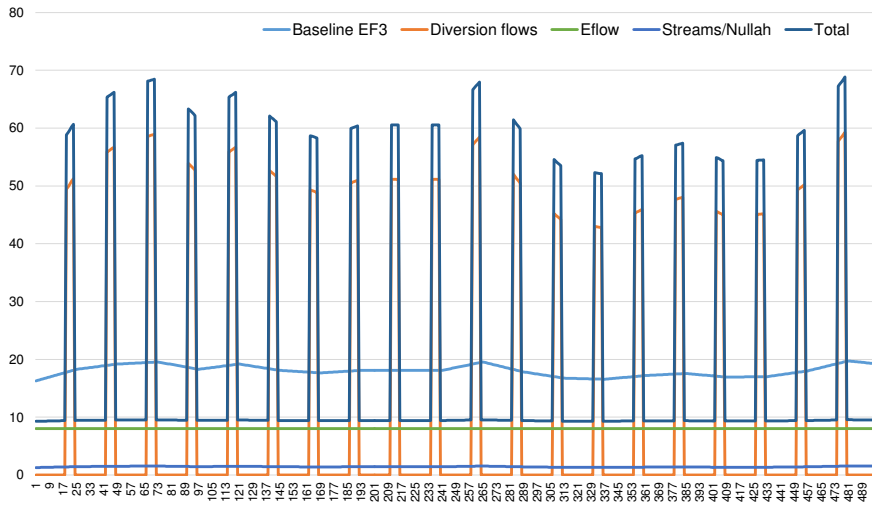
Flow Downstream of Dam (low flow section)



Flow Downstream of Tailrace (peaking section)



Downstream of Tailrace – Dry Season



Indicator Species



Alwan Snow Trout *Schizothorax richardsonii*



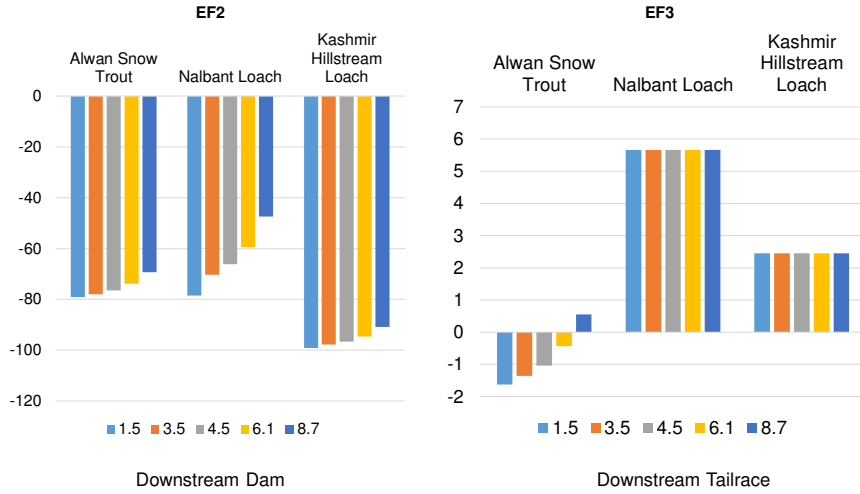
Nalbant's Loach *Schistura nalbanti*



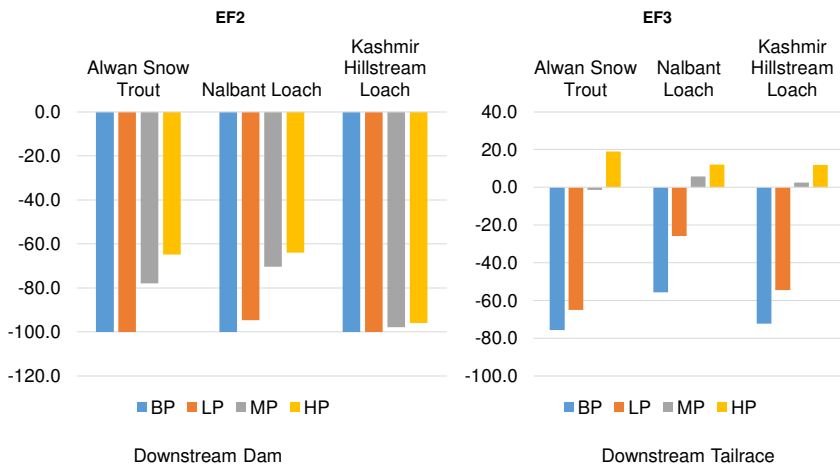
Kashmir Hillstream Loach *Trilophypha kashmirensis*



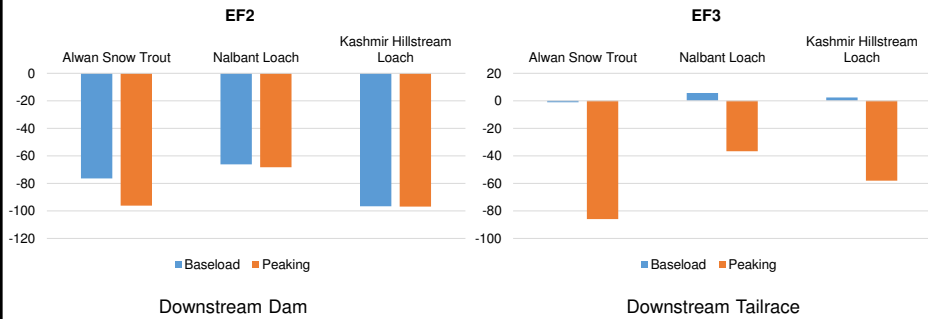
Increasing Environmental Flow



Increasing Protection (with Eflow of 4.5 m³/s)



Baseload vs. Peaking Flows (with Eflow of 4.5 m³/s and Medium Protection)



Net Gain Calculations

	Baseload					Peaking		
	1.5	3.5	4.5	6.1	8.7	1.5	4.5	6.1
Environmental Flow (m ³ /s)	1.5	3.5	4.5	6.1	8.7	1.5	4.5	6.1
Against Business as Usual Baseline								
Alwan Snow Trout	68	69	69	71	73	8	13	16
Nalbant Loach	32	36	38	41	46	8	13	15
Kashmir Hillstream Loach	44	45	45	46	49	7	10	12
Against Low Protection Baseline								
Alwan Snow Trout	55	56	57	58	61	-4	1	3
Nalbant Loach	6	10	12	16	20	-18	-13	-10
Kashmir Hillstream Loach	32	33	33	34	37	-4	-2	0
Power Loss	0.2%	2.5%	3.8%	5.7%	8.7%	0.0%	2.1%	3.5%
USD Loss	\$300,000	\$3,300,000	\$4,900,000	\$7,400,000	\$11,300,000	\$ -	\$ 2,800,000	\$4,600,000
Suggested Scenarios								



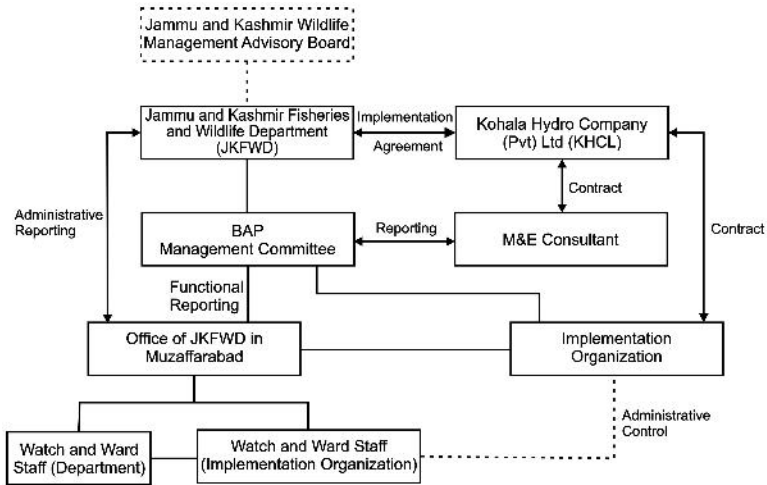
Conclusions of the EFlow Assessment

- With baseload operation the Project can operate at an Eflow of 1.5 m³/s
- With peaking operation the Project can operate at an Eflow of 6 m³/s for an associated loss in power of 3.5% over the 1.5 m³/s Eflow.

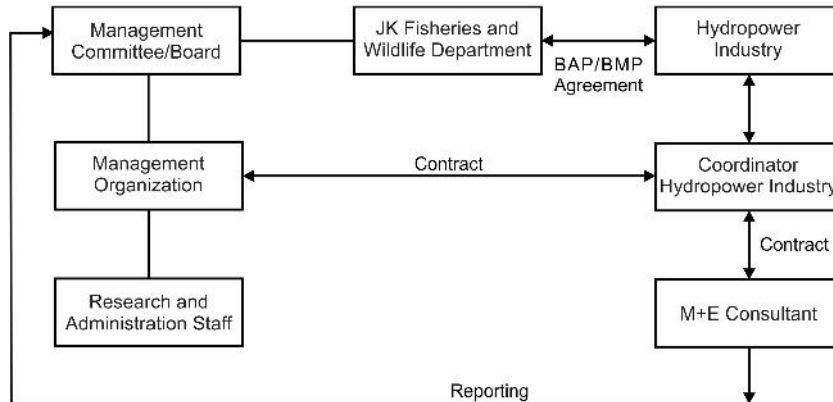


Management

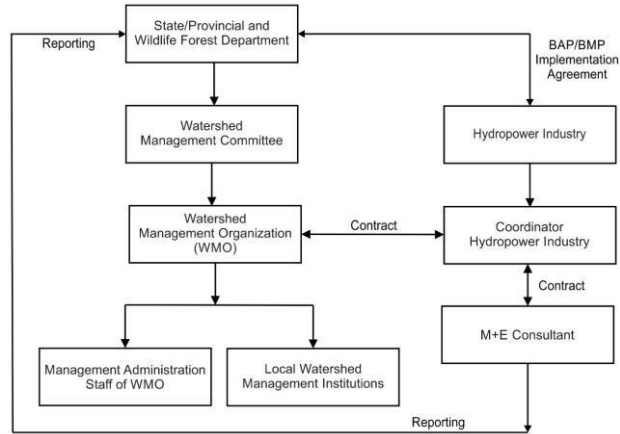
Institutional Arrangements for Management of Protection – Kohala Hydropower Project



Institutional Arrangement for Management of the Institute for Research on River Ecology – Kohala Hydropower Project



Institutional Arrangement for Watershed Management – Kohala Hydropower Project



Appendix S: Index of Structures within Blasting Induced Vibration Risk Zones

Structures that lie within blasting induced vibration risk zone are listed in this appendix. See **Section 7.5 (Blasting and Vibration)** of the EIA report for details.

Exhibit S.1: Structures in Structural Damage Risk Zone

Map ID	Center point Coordinates (Degree Decimal)	
	X	Y
1	34.6301	73.4258
2	34.6299	73.4258
3	34.6114	73.3948
4	34.6117	73.3946
5	34.6120	73.3947
6	34.6286	73.4272
7	34.6289	73.4270
8	34.6295	73.4268
9	34.6301	73.4262
10	34.6328	73.4362
11	34.6329	73.4366
12	34.6332	73.4360
13	34.6333	73.4368

Exhibit S.2: Structures in Cosmetic Damage Risk Zone

Map ID	Centre point coordinates (Degree Decimal)	
	X	Y
14	34.6600	73.4535
15	34.6602	73.4538
16	34.6593	73.4545
17	34.6592	73.4537
18	34.6590	73.4544

Map ID	Centre point coordinates (Degree Decimal)	
	X	Y
19	34.6314	73.4274
20	34.6312	73.4274
21	34.6313	73.4275
22	34.6024	73.3785
23	34.6028	73.3784
24	34.5889	73.3676
25	34.5881	73.3671
26	34.5905	73.3687
27	34.5899	73.3686
28	34.6600	73.4536
29	34.6602	73.4540
30	34.6603	73.4539
31	34.6602	73.4537
32	34.5896	73.3692
33	34.5902	73.3701
34	34.5908	73.3691
35	34.5941	73.3717
36	34.5940	73.3719
37	34.5943	73.3721
38	34.6011	73.3780
39	34.6013	73.3781
40	34.6015	73.3785
41	34.6021	73.3787
42	34.6029	73.3776
43	34.6031	73.3777
44	34.6041	73.3783

Map ID	Centre point coordinates (Degree Decimal)	
	X	Y
45	34.6044	73.3783
46	34.6049	73.3829
47	34.6050	73.3846
48	34.6050	73.3827
49	34.6054	73.3832
50	34.6057	73.3850
51	34.6066	73.3940
52	34.6067	73.3934
53	34.6069	73.3940
54	34.6069	73.3923
55	34.6070	73.3936
56	34.6071	73.3938
57	34.6072	73.3928
58	34.6072	73.3923
59	34.6071	73.3920
60	34.6071	73.3933
61	34.6073	73.3934
62	34.6073	73.3937
63	34.6075	73.3936
64	34.6074	73.3919
65	34.6073	73.3912
66	34.6077	73.3939
67	34.6080	73.3935
68	34.6077	73.3922
69	34.6081	73.3914
70	34.6083	73.3952
71	34.6085	73.3950
72	34.6088	73.3949
73	34.6089	73.3943
74	34.6099	73.3944
75	34.6099	73.3942
76	34.6100	73.3958
77	34.6101	73.3961

Map ID	Centre point coordinates (Degree Decimal)	
	X	Y
78	34.6104	73.3946
79	34.6105	73.3954
80	34.6105	73.3943
81	34.6103	73.3950
82	34.6106	73.3961
83	34.6104	73.3957
84	34.6108	73.3951
85	34.6111	73.3941
86	34.6115	73.3939
87	34.6120	73.3941
88	34.6121	73.3940
89	34.6124	73.3978
90	34.6132	73.3923
91	34.6135	73.3926
92	34.6140	73.3927
93	34.6142	73.3933
94	34.6146	73.3934
95	34.6185	73.4231
96	34.6186	73.4236
97	34.6190	73.4231
98	34.6191	73.4224
99	34.6197	73.4225
100	34.6283	73.4278
101	34.6289	73.4258
102	34.6300	73.4291
103	34.6303	73.4360
104	34.6302	73.4297
105	34.6303	73.4332
106	34.6305	73.4323
107	34.6308	73.4362
108	34.6323	73.4349
109	34.6322	73.4374
110	34.6328	73.4370

Map ID	Centre point coordinates (Degree Decimal)	
	X	Y
111	34.6329	73.4377
112	34.6332	73.4377
113	34.6334	73.4374
114	34.6337	73.4390
115	34.6344	73.4381
116	34.6345	73.4371

Map ID	Centre point coordinates (Degree Decimal)	
	X	Y
117	34.6346	73.4369
118	34.6350	73.4371
119	34.6352	73.4370
120	34.6353	73.4394

Exhibit S.3: Structures near Dam Site

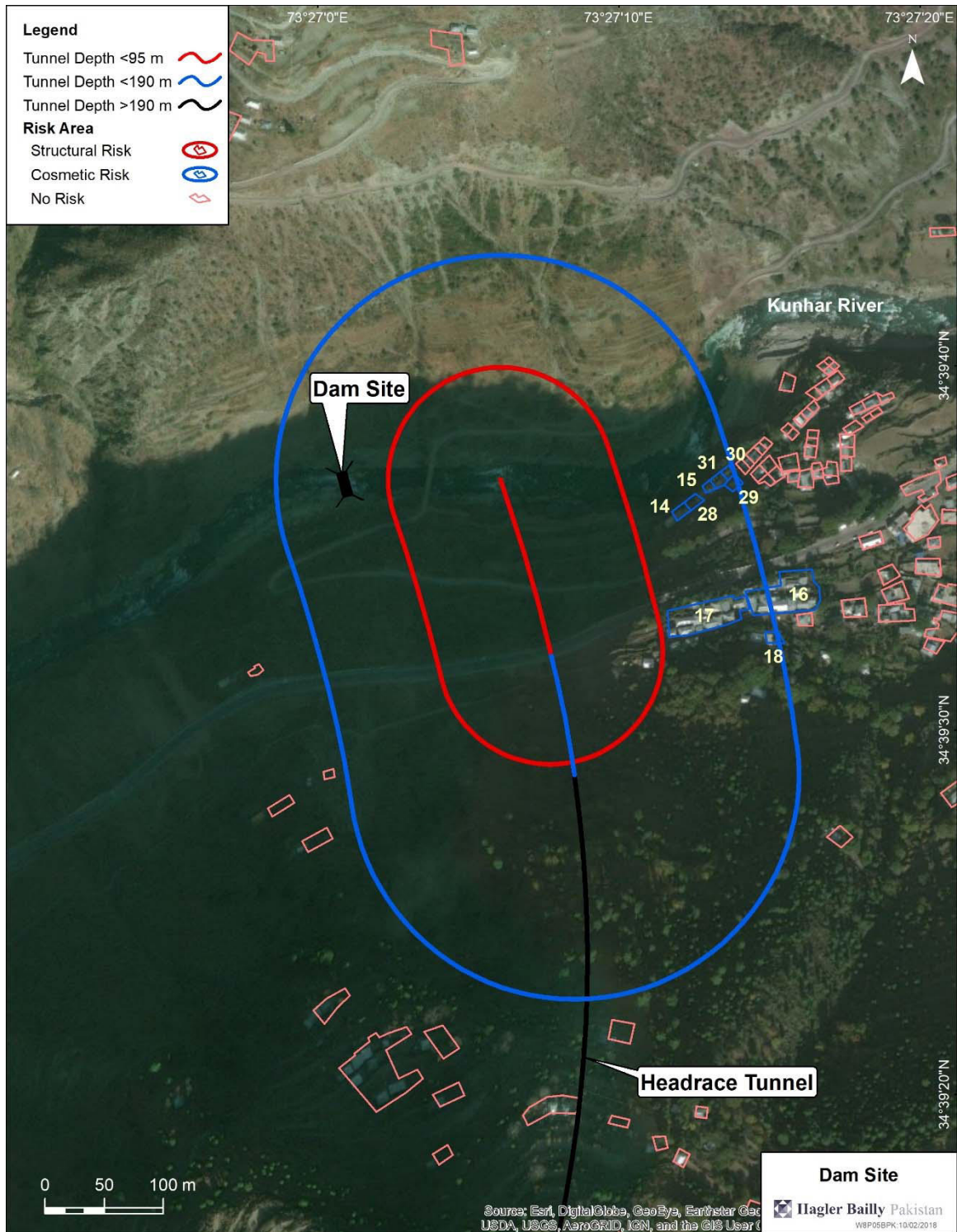


Exhibit S.3: Structures near Adit 1

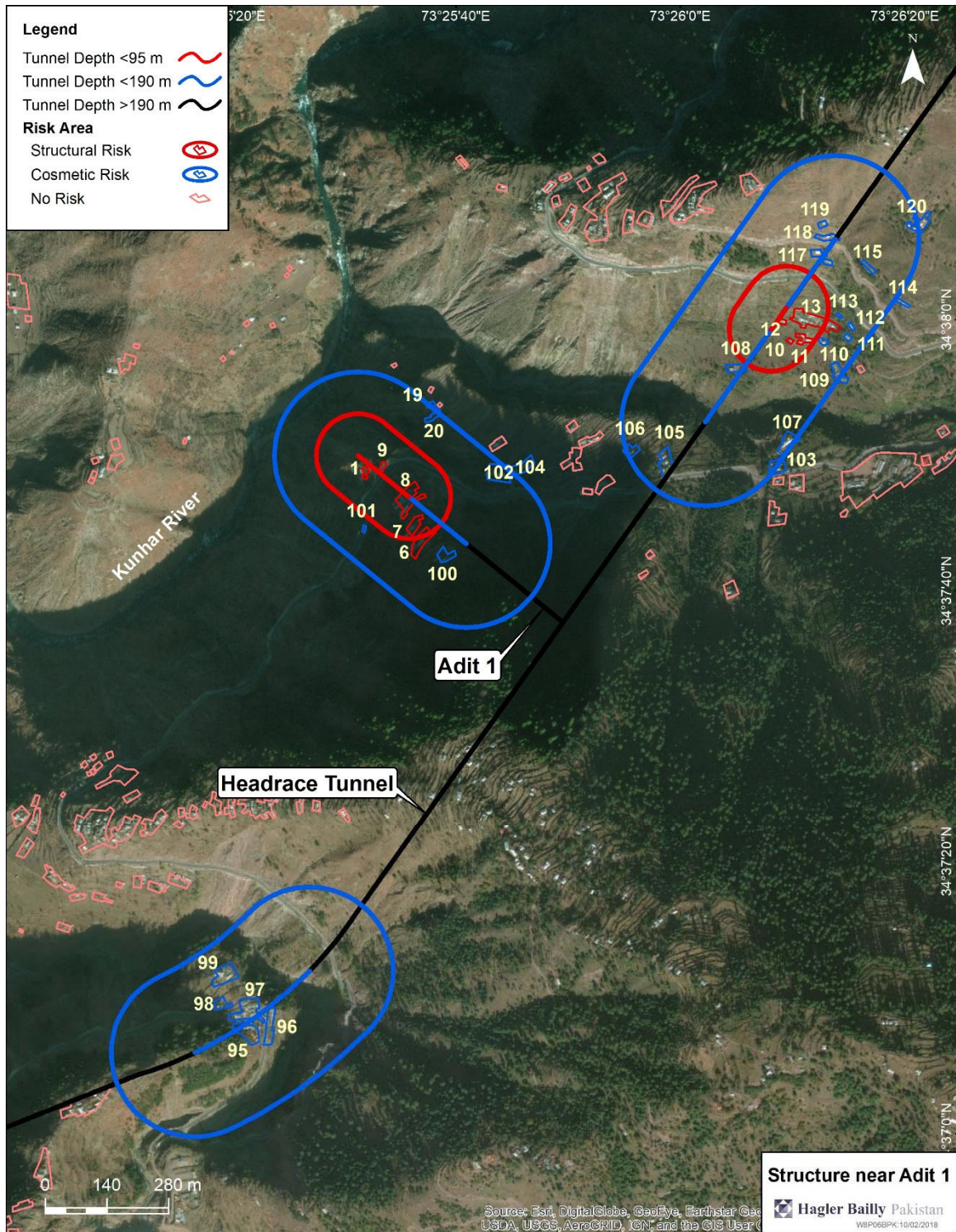


Exhibit S.4: Structures near Adit 2

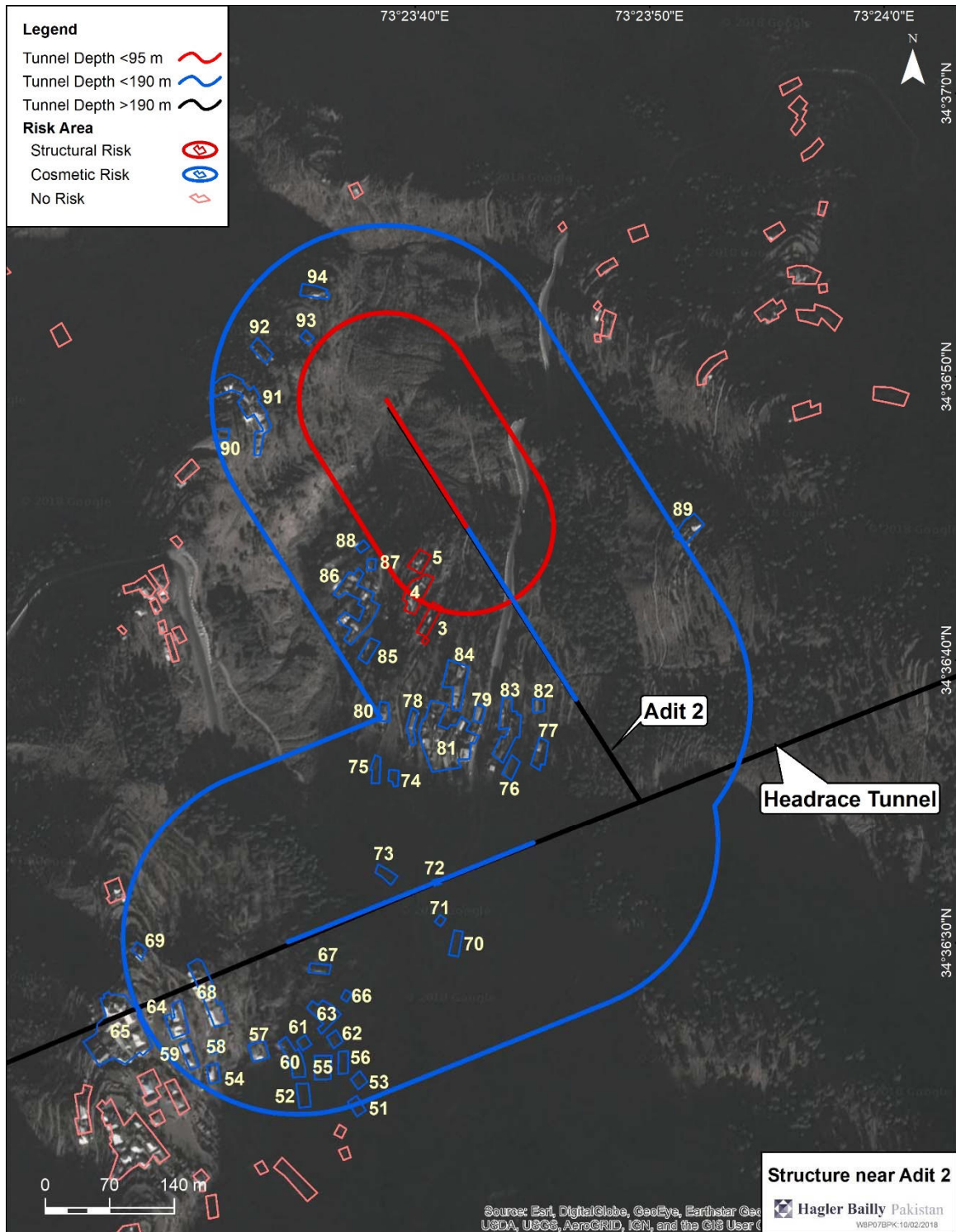
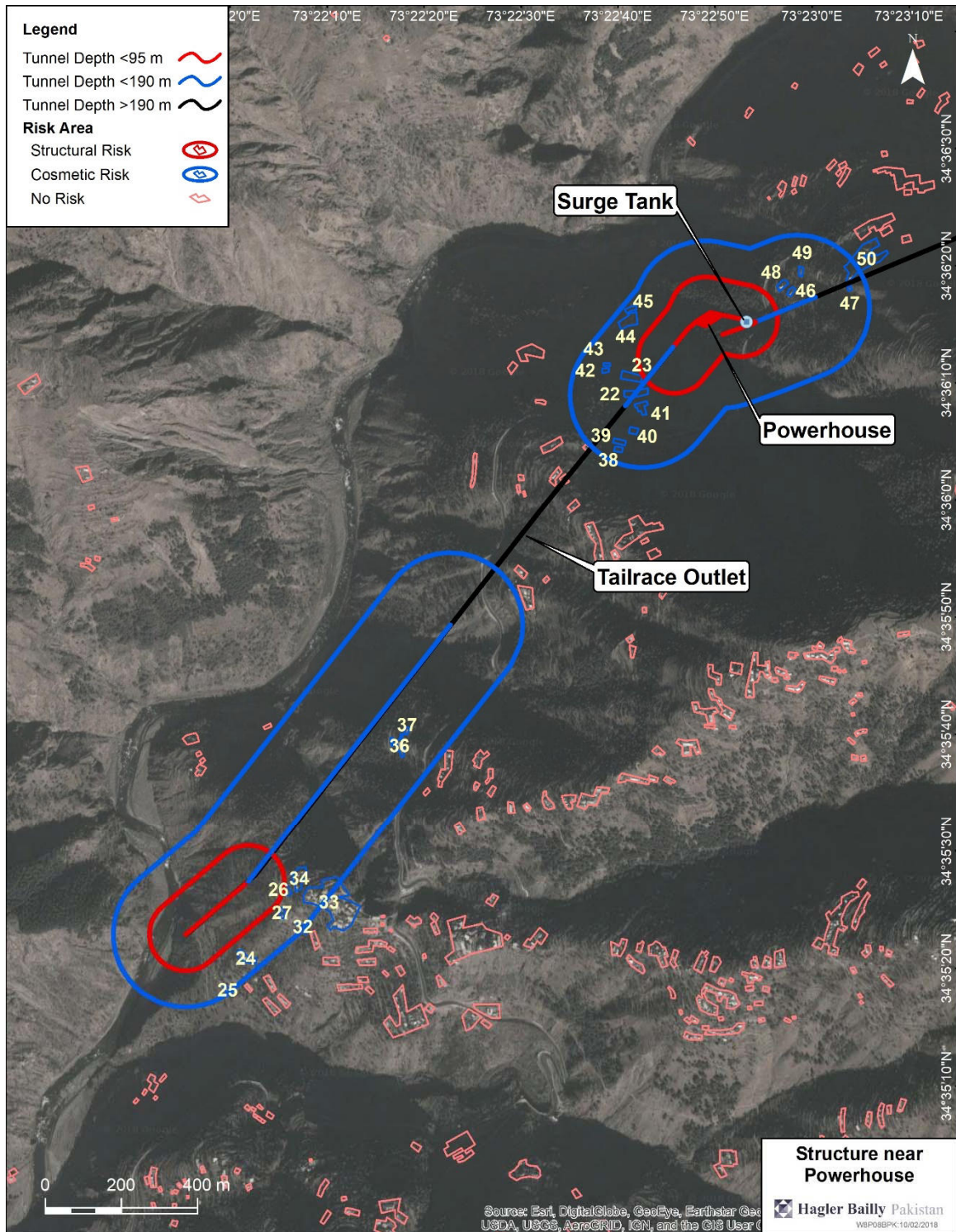


Exhibit S.5: Structures near Powerhouse



Appendix T: Socioeconomic Impacts of Dam Break-BHDP

T.1 Introduction

The Pakhtunkhwa Energy Development Organization (PEDO) intends to construct a 300 megawatt (MW) run-of-river hydropower plant at Balakot, in Mansehra District of Khyber Pakhtunkhwa (KP), Pakistan. The Project called Balakot Hydropower Development Project (BHDP) is located on the Kunhar River about 18.6 kilometer (km) upstream of the town of Balakot. The Asian Development Bank (ADB) is financing the Project. This appendix provides estimates of socioeconomic impacts as a result of dam break and recommends mitigation and management measures.

T.2 Methodology

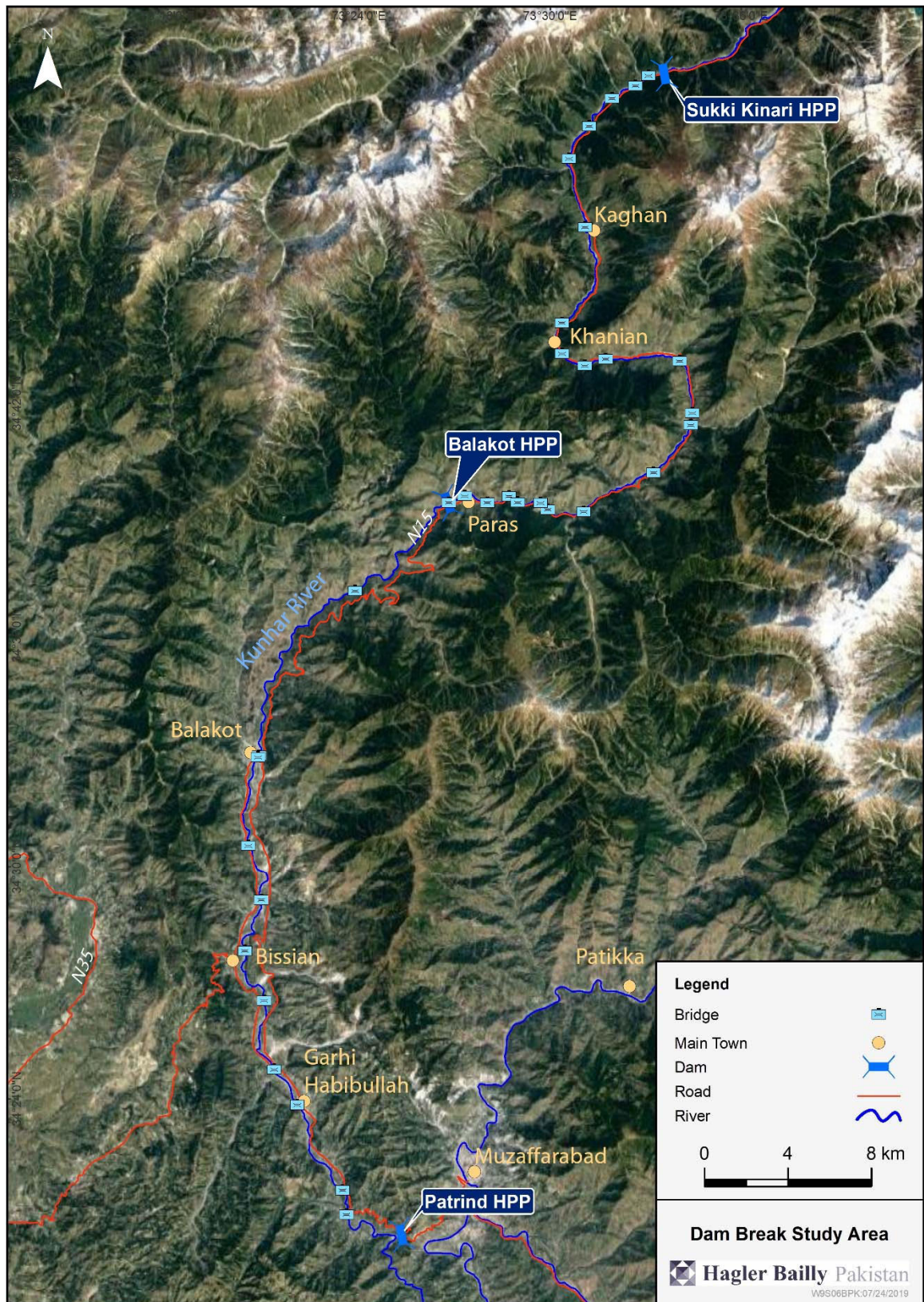
Socioeconomic impacts of dam break were estimated using *Google Earth™* satellite imagery utilizing data of extent of flood as a result of dam break provided in Dam Break Study¹. The estimated extent of flood is provided in **Attachment 1**. Population on risk was estimated using average household size of 6.2 persons per household². The study area of the Dam Break Study is around Kunhar River from Sukki Kinari dam site up to and ends to just downstream of Patrind dam site. **Exhibit T.1** shows study area and infrastructure in the study area. The impacts of dam break were analyzed based on different dam break sceneries provided in dam break study as below;

- ▶ Scenario A (Balakot dam breach):
 - ▷ Scenario A-1: “Rainy day” dam failure of Balakot dam (flood-induced dam failure);
 - ▷ Scenario A-2: “Sunny day” (normal conditions) dam failure (earthquake induced dam failure).
- ▶ Scenario B (Cascade Dam failure – both Sukki Kinari and Balakot dams breach):
 - ▷ Scenario B-1: “Sunny day” (normal conditions) cascade dams’ failure (earthquake induced dam failure).

¹ Aqualogus, June 2019, Draft Final Report D2.2B – Feasibility Study for the 300 MW Balakot Hydropower Project Annex XI – Dam Break Study, for the Asian Development Bank and Pakhtunkhwa Energy Development Organization.

² **Section 4.3.3** Socioeconomic conditions in the study area.

Exhibit T.1: Study Area and Infrastructure in the Study Area



T.3 Socioeconomic Impacts of Dam Break

For different scenarios of dam break socioeconomic impacts are provided in following sections.

T.3.1 Scenario A-1 (Rainy Day, Balakot)

Infrastructure at Risk

As a result of scenario A-1, 17 km of N 15 (national highway) and Balakot to Muzaffarabad road will be affected including Balakot bridge on Kunhar River. These roads connect Mansehra and Muzaffarabad with Chilas reservoir. Further there are 10 more bridges on Kunhar river from Balakot dam site up to reservoir of Patrind HPP which connect settlements across the river. With the dam break these bridges will also be affected.

Population at Risk

As mentioned in the Dam Break Study in scenario A-1, the progression of flood in “wet” conditions is quite rapid, reaching Balakot town area in approximately 20 min and Patrind in about 1 hour.

The estimated socioeconomic impacts of scenario A-1 are provided in **Exhibit T.2**. As mentioned in **Exhibit T.2**, as a result of dam break houses at risk will be approximately 4,235, commercial buildings at risk will be approximately 217, agricultural land at risk will be approximately 522 hectares and human population at risk will be approximately 26,103 persons.

Exhibit T.2: Population at Risk Along Kunhar River (Scenario A-1)

<i>Location</i>	<i>No. of Settlements</i>	<i>Houses</i>	<i>Commercial Buildings</i>	<i>Agricultural Land (Hectares)</i>	<i>Population</i>
Balakot Dam to Balakot City	7	18	7	6.64	112
Balakot City	1	322	138	40.00	1,932
Balakot to Garhi Habibullah	10	1323	22	255.76	8,203
Garhi Habibullah	1	897	15	30.00	5,472
Garhi Habibullah to Patrind Dam	16	1675	35	189.24	10,385
Total	35	4235	217	521.64	26,103

T.3.2 Scenario A-2 (Sunny Day, Balakot)

Infrastructure at Risk

As a result of scenario, A-2, 13 km of N 15 (national highway) and Balakot to Muzaffarabad road will be affected including balakot bridge on Kunhar River. These roads connect Mansehra and Muzaffarabad with Chilas. Further there are 10 more bridges on Kunhar river from Balakot dam site up to Patrind reservoir which connect settlements on right bank of the river with settlements on the left bank of the river. With the dam break these connections will also be affected.

Population at Risk

As mentioned in the Bam Break Study in scenario A-2 the flood wave with peak flow will reach Balakot town in approximately 35 min and Patrind in about 2 hours. The estimated socioeconomic impacts of scenario A-2 are provided in **Exhibit T.3**. As mentioned in **Exhibit T.3** as a result of dam break houses at risk will be approximately 173, commercial buildings at risk will be approximately 34, agricultural land at risk will be approximately 358 hectare and population at risk will be approximately 1,049 persons.

Exhibit T.3: Population at Risk along Kunhar River (Scenario A-2)

<i>Location</i>	<i>No. of Settlements</i>	<i>Houses</i>	<i>Commercial Buildings</i>	<i>Agricultural Land (Hectares)</i>	<i>Population</i>
Balakot Dam to Balakot City	7	17	5	2.95	105
Balakot City	1	35	15	7.00	209
Balakot to Garhi habibullah	4	10	0	205.29	62
Garhi Habibullah	1	76	9	3.00	456
Garhi Habibullah to Patrind Dam	16	35	5	140.18	217
Total	29	173	34	358.42	1,049

T.3.3 Scenario B (Sunny Day, Cascade)

Infrastructure at Risk

As a result of scenario, B 21 km of N 15 (national highway) and Balakot to Muzaffarabad road including two main bridges on Kunhar River (at Balakot and Kaghan) will be affected. These roads connect Mansehra and Muzaffarabad with Chilas. Further there are 31 more bridges on Kunhar river from Sukki Kinari dam site to Patrind reservoir which connect settlements on right bank of the river with settlements on the left bank of the river. By the Dam break these connections will also be affected.

Population at Risk

As mentioned in the Bam Break Study in scenario B, flood wave from Sukki Kinari will reach Paras/Balakot dam with a peak flow in approximately 45 min after the upstream (Sukki Kinar) dam full failure. The flood peak will reach Balakot town in about 75 minutes after the full failure of Sukki Kinari Dam. The estimated socioeconomic impacts of scenario B, are provided in **Exhibit T.4**. As mentioned in **Exhibit T.4** as a result of dam break houses at risk will be approximately 3,988, commercial buildings at risk will be approximately 585, agricultural land at risk will be approximately 489 hectare and population at risk will be approximately 2,4521.

Exhibit T.4: Population at Risk along Kunhar River (Scenario B)

<i>Location</i>	<i>No. of Settlements</i>	<i>Houses</i>	<i>Commercial Buildings</i>	<i>Agricultural Land (Hectares)</i>	<i>Population</i>
Kaghan	1	3	2		18
Kaghan to Khanian	5	7	1	0.88	43

<i>Location</i>	<i>No. of Settlements</i>	<i>Houses</i>	<i>Commercial Buildings</i>	<i>Agricultural Land (Hectares)</i>	<i>Population</i>
Khanian	1	13	3	0.00	78
Khanian to Balakot City	23	230	25	12.25	1,426
Balakot City	1	327	110	35.00	1,962
Balakot to Garhi Habibullah	10	1114	150	242.63	6,907
Garhi Habibullah	1	682	230	12.00	4,092
Garhi Habibullah to Patrind Dam	16	1612	64	186.69	9,994
Total	58	3988	585	489.46	24,521

T.4 Recommendations and Management Measures

The recommended mitigation and management measures include:

- ▶ An Emergency Preparedness and Response Plan (EPRP) for the Project is included in Environment Management Plan. The EPRP includes consideration of flooding, as well as potential dam breach situations. The EPRP will be reviewed by PEDO annually and before starting operations. PEDO will also develop an alarm system to alert communities at risk in time in case of emergencies.
- ▶ PEDO will co-ordinate with local administration, upstream HPP operators to avoid dam break and with downstream HPP operators and communities to minimize impacts of dam break in case of dam break.
- ▶ PEDO will maintain network of climate gauges in the Kunhar catchment to monitor potential floods at Mangla through WAPDA or in conjunction with other hydropower developers. It is recommended PEDO request and utilize real-time climate information with particular focus on flood season (June to August), as well as September when extreme floods are known to occur in the Kunhar catchment. Real-time monitoring of weather conditions that historically persisted before major extreme rainfall events will highlight potential development of conditions of major storms.
- ▶ Automated telemetric flow gauges can be installed and operated in conjunction with Sukki Kinari HPP and Patrind HPP. This will warn PEDO on potential flooding conditions, in addition to being aware of climatic conditions as recommended above.
- ▶ Where climatic data and flow data indicate eminent floods, appropriate management measures of the reservoir level will be under taken by the PEDO. These may include full opening of gates (including low level outlets) with aim of reducing water levels to below Normal Operating Level at Balakot HPP reservoir, to reduce risk of dam break, particularly due to overtopping.
- ▶ In addition to the management measures solely at Balakot HPP, it is recommended that a flood management strategy is developed by all hydropower project operators in the Kunhar River. This will reduce risk of dam overtopping failure under flood conditions, in particular.

Attachment 1: Estimated Extent of Flood as a Result of Dam Break

