Environmental and Social Monitoring Report

Project Number: 44914-014
Quarterly Report (July – September 2020)
September 2020

Pakistan: Patrind Hydropower Project

Prepared by Star Hydro Power Limited for the Asian Development Bank.

STAR HYDRO
K-water Global

147 MW PATRIND HYDROPOWER PROJECT

Environmental & Social Monitoring Report
Jul 2020 to Sep 2020

Contents

List of Abbreviations

AJK	Azad Jammu & Kashmir
CEO	Chief Executive Officer
CLO	Community liaison officer
CSR	Corporate Social Responsibility
E-flow	Environmental flow
ERP	Emergency Response Plan
ESMP	Environmental & social management plan
HSE	Health safety & environment
KPK	Khyber Pakhtunkhwa
NEQS	National environmental quality standards
OHSP	Occupational health & safety plan
POPL	Patrind Operation & Maintenance Private Limited
PHSP	Public health & safety plan
PTW	Permit to work

1. Health, Safety and Environmental (HSE) Performance Indicators

Table 1: HSE Performance Indicators

Indicators	Data (Reporting Period)	Data (From November 08, 2017 to Sep 30, 2020)
Plant Safe Man-Hours Plant Safe-Days	39,656 (0.039656) 92	448,760 (0.44876) 1063
Lost Time Injury (LTI)	0	00
HSE / Environmental Accidents	0	00
Fire	0	00
Spills	0	00
HSE Audits / Inspections	04	50
HSE Training Sessions	04	34
Near-Miss Reported	00	00
Emergency Drills (Evacuation, Firefighting & First Aid)	00	04
PTW Issued	00	164
Community Consultations	00	52

2. Compliance NOC Conditions issued by EPA AJK

Table 2: Compliance Status of NOC Conditions

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
I.	Compliance to National Environmental Quality Standards (NEQSs)	Yes	Compliance with NEQSs is being monitored internally and through third-party.
II.	2 Cumecs water as E-flow, downstream during the operational phase	Yes	2.2 Cumecs environmental flow is being released from the weir. Please refer to **Annex-1** for E-flow data. Data shows compliance with the NOC condition.
III.	Metering arrangement to ensure and verify the release of approved E-flow downstream	Yes	The metering arrangement is in place. Sensors are installed on five (05) different locations. Data is being recorded on a real-time basis on a **10**-minute interval. Data is being shared with lenders and EPA-AJK on quarterly basis through quarterly reports. Please refer to **Annex-2** for calibration certificates, sensors locations and evidences of manual / visual flow monitoring.
IV.	Strictly adhered to mitigation measures, as suggested in the Operational	Yes	Quarterly compliance reports verify adherence to the mitigation measures.

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
	Environmental Management Plan (OEMP)		
V.	Environmental Management & Monitoring unit headed by an Environmental Monitoring Expert	Yes	Qualified and competent HSE team has been formulated which consists of HSE Manager, Environmentalist, HSE Officer and two Community Liaison Officers in the O&M team. Qualified and competent Senior Manager-E&S from SHPL is also monitoring the compliance from the SHPL side.
VI.	Carry out Fish Study through certified Fish Expert/Firm throughout the operational period of the project	Yes	The fish studies are being conducted every quarter and reports are being submitted. During the reporting period, one (01) fish study was conducted. The study discusses the impacts on fish & aquatic fauna in reservoir & downstream; and required mitigation measures. Please refer to **Section 8** for study summary and **Annex-3** for study report.
VII.	Environmental Audit through 3rd party consultant after every 05 years during the Operational Phase of the Project	Yes	The requirement will be effective after November, 2022 and will be complied when required. Still, the operation is in its third year. Before conducting the audit, audit terms of reference (ToR) will be prepared and shared with lenders.
VIII.	Plantation (of indigenous species) activity, in consultation with Forest Department, Govt. of AJ&K, both at the Weir & Powerhouse	Yes	Annual plantation campaign is an activity which has been carried out since the start of project. Only indigenous species are being planted. Campaigns are conducted under the supervision of third-party expert. The plant species are recommended by the vegetation expert as per the characteristic of the species. During 1st quarter, plantation campaign and bio-engineering works were conducted. Reports and details of these activities were given in 1st quarter report. Please refer to **Section 8** for results of these activities.
IX.	Continuous monitoring & submission of quarterly compliance report	Yes	Quarterly compliance reports are being prepared and submitted.
X.	Adequate arrangements for addressing public grievances	Yes	Grievance redressal procedure is in place. The grievance redressal committee (GRC) has been formulated and

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
			functional. Three (03) complaint boxes have been installed at powerhouse area and two (02) complaint boxes have been installed at weir site area. Further two (02) complaint registers have been placed at powerhouse area and one (01) complaint register has been placed at the weir site area. Community Liaison Officers (CLOs) have also been deputed on powerhouse and weir site areas. No complaint was received in the reporting period.
XI.	Findings of third-party monitoring shall be shared with AJK- EPA	Yes	Third party monitoring i.e. fish, vegetation, landslide, water quality and air quality is being conducted on quarterly basis. The results / measurements of the reports from the third party are being shared with AJK-EPA and lenders. The ESCR referred in the comments of 1st quarter report is a different report which has already been submitted to EPA-AJK in March 2019 and no comments further comments received.
XII.	Arrangements in-place for the execution of CSR plan	Yes	CSR procedure is in place. Based on the CSR procedure, annual CSR plan is developed and implemented. Annual CSR plan is developed and finalized in consultation with local communities and based on the needs of local communities. General areas of focus are education, health, livelihood, living conditions, water, and cultural, etc. The O&M operator develops its annual CSR plan each year in the month of March after consultations with local communities. However, this year CSR plan was not developed in the reporting period due to Covid-19 pandemic situation. Tentatively the CSR budget of O&M Operator for year 2020 may be approximately USD 4,000-5,000. However, SHPL has its separate budget for CSR and for this year i.e. 2020 the approx. figure is 50,000 USD.
XIII.	Efficient Occupation Health & Safety Plan	Yes	Occupation health and safety plan is in place. The plan has been developed based on the findings of risk assessment. The plan has been proved effective as the operations are smooth and safe. As the plan is live document it will be updated

EPA Condition No	EPA NOC Conditions	Compliance Status	Compliance Action/Notes
			when required.
XIV.	Local Employment	Yes	Hiring is being done keeping the locals on priority. Currently, the total staff is 73, out of which 66% from AJK, 18% from KPK and 16% from other parts of Pakistan. Total 10 persons from the affected villages have been employed in the plant operational phase out of which 06 household affected have been employed by the O&M operator. Please refer to the **Annex-4** for details regarding the local employment. This annexure depicts information about (10) local people employed and effected households employed in the company as regular and permanent staff. The annex also shows the levels and designations at which these local people are working in the company. In short, local people are working from junior to senior roles including drivers, sub-technicians, technicians, operators, officers, assistant managers, and managers etc. Currently, no female staff is employed. However, there is no gender discrimination during job advertising and hiring process. Please refer to the **Annex-4** for photo of job advertisement. In addition, 12 unskilled and 14 security staff are also working, all of them are locals. These 12 unskilled staff are daily labors and while the security staff belongs to third-party security company and Police. There is no restriction on female employment however, the local communities did not show any interest in hiring of female CLO.
XV.	Liable for the correctness and validity of the information provided in EMP	Yes	Agreed.
XVI.	Facilitate EPA team for any visit for inspection/monitoring, etc.	Yes	The Company will always facilitate all the stakeholders including EPA for site visits.

3. Compliance with Environmental and Social Management Plan (ESMP)

Table 3: Compliance Status of ESMP

ESMP Reference #	ESMP Requirement	Compliance Status	Compliance Action/Notes
Section 6.1	Quarterly Fish and Fauna assessment (Kunhar River)	Yes	Please refer to **Row VI of Table 2, Section 2**.
	Bi-Annual drinking & waste Water Quality	Yes	Bi-Annual drinking and waste water analysis conducted in the reporting period and report. Please refer to **Annex-5** for the detailed reports
	Quarterly Flora / vegetation monitoring	Yes	During the reporting period, one (01) Flora/vegetation monitoring study was conducted. The study report shows that impact reported on the weir side is low and in some aspects it is positive. Please refer to **Section 8** for study summary and **Annex-6** for study report.
	Annual Landslides monitoring	Yes	Annual landslide and catchment study will be conducted by the end of this year. Report will be shared in the last quarter report.
	Quarterly noise monitoring and noise impact management	Yes	Noise monitoring is being done monthly and data is being maintained. Monitoring locations include process area (Basement 1, 2 & 3), office building (Ground floor and first floor) and Alda village (village area close to the powerhouse). This monitoring is being done internally by the HSE team. Turbine units are installed at Basement areas 1, 2 & 3. The noise level exceeds in the area depending on the unit operation. Keeping in view the noise level, necessary instructions are communicated to the staff working in that area and proper PPEs are ensured. Noise level in rest of the areas is within the limits. Please refer to **Annex-7** for the noise monitoring reports. Ear-plugs have already been provided to all staff. Ear-muffs have also been provided to the staff working in the basement areas. For vibration, phase-wise installation of anti-vibration mates will be done. Meetings with various vendors on anti-vibration mates have been conducted. Once the samples are received, these will be shared and discussed with the Management for approval.

	Environmentally-friendly disposal of solid waste	Yes	Waste generated on both sites is being disposed of in an environmentally friendly manner through a third-party waste contractor. Please refer to **Annex-8** waste transfer notes. During the reporting quarter 4.5 tons of non-hazardous waste was generated. Out of which 71 KG was recycled and remaining was disposed of by the approved waste contractor.
	Development and implementation of CSR Plan and procedure /Community Development Programs	Yes	Please refer to **Row XII of Table 2, Section 2** and **Section 6**.
	Labors / Employees management as per applicable regulations and standards.	Yes	Labors / Employees are being managed as per applicable regulations and standards. An internal grievance redressal mechanism is also in place. Internal GRC has been formed and the complaint box has been installed. No internal complaints were received in the reporting period.
	Workers/Staff Health & Safety as per applicable regulations and standards	Yes	Please refer to **Row XIII of Table 2, Section 2**.
	Grievances from communities and any affected people Grievances from civil society organizations Grievances from labor/employees	Yes	For the external grievance redressal mechanism, please refer to **Row X of Table 2, Section 2**. An internal grievance redressal mechanism is also in place. Internal GRC has been formed and the complaint box has been installed. No internal complaints were received in the reporting period.

4. Compliance with Operational Requirements of EIA

(Environmental Monitoring and Management Plan during Operations Phase)

Table 4: Compliance Status of EMP of EIA Addendum

EIA Addendum Reference #	Impacts	EMP Requirement	Monitoring Frequency	Compliance Status	Compliance Action/Notes
Table: 6.4	Water Impoundment	Water Elevation Level Incoming/outgoing flow	Monthly	Yes	Water impoundment is being monitored via sensors. Every ten-minute data is being uploaded on the system. Sensors are being calibrated annually through third-party experts while all the sensors are being inspected/ checked visually by maintenance team on monthly basis. For details on sensors, please refer to the **Annex-2**.
	Environmental Flow	Water flowing down-stream in Kunhar river	Monthly	Yes	Please refer to **Row II of Table 2, Section 2**.
	Aquatic Fauna	Fish, upstream-downstream and in the pond	Quarterly	Yes	Please refer to **Row VI of Table 2, Section 2**.
	De-sanding	Accumulation of silt and de-siltation process	_	Yes	Monthly bathymetric surveys are being conducted to check the level of silt / sand in the reservoir.

5. Compliance Actions against other HSE Plans

Table 5: Compliance Actions against other HSE Plans

S. N	Plan	Compliance Actions in the Reporting Period
1	OHS Plan	• Implementation of permit to work system (PTW) is in place and during the reporting quarter no PTW was issued. • Except near-misses, data on all other indicators are given in section 1 of the report. Near-misses, UA & UA reporting program will be launched in third-quarter and data on these indicators will also be included in section 1 of the report accordingly. • HSE trainings and awareness sessions for staff were conducted. During the reporting period 03 training sessions were conducted. • During the reporting period 05 HSE inspections were carried out and highlighted issues were rectified by the concerned department. • Implementation of lockout-tagout procedures (LOTO) • 03 Monthly Fire extinguishers inspections were conducted. • 03 Monthly noise monitoring's conducted during the reporting period and all the readings were in compliance to NEQSs. • Atmospheric testing in confined spaces • Implementation of PPE policy and procurement of required PPEs
2	Traffic Management Plan (TMP)	• Defensive driving training of all drivers • Installations of warning signboards like speed limits, overtaking restriction etc. • Prohibition on use of short-cuts and unsafe routes • Installation of reverse alarm in all vehicles • Regular vehicles inspection • Regular vehicles maintenance
3	Annual CSR Plan	• CSR Plan for the year 2020 and its budget will be finalized by K-water Head Office. • Tentatively the CSR budget of O&M Operator for year 2020 may be approximately USD 4,000-5,000. However, SHPL has its separate budget for CSR and for this year i.e. 2020 the approx. figure is 50,000 USD
4	Waste Management plan	• Segregation of wastes being generated • During the reporting quarter 4.5 tons of non-hazardous waste was generated. Out of which 71 KG was recycled and remaining was disposed of by the approved waste contractor. • Placement of colored waste bins • Collection, transportation, recycling and disposal of wastes by company hired waste contractor • Data management of waste consignment notes being provided by company hired waste contractor

S. N	Plan	Compliance Actions in the Reporting Period
		• Waste management monitoring by HSE team
5	Public Health & Safety Plan	• Deputation of security / watch guards in weir downstream • Continuous monitoring of seismic movements at weir sites by maintenance team (Accelerometer helps to grasp the magnitude of the earthquake that occurred near the dam and monitors the safety of the dam. At Weir site, three (03) seismic Accelerometers are installed at three locations as follows: ➢ Accelerator 01 Elevation: 742 masl , Location: Weir Gallery ➢ Accelerator 02 Elevation: 765 masl , Location: Weir Crest ➢ Accelerator 03 Elevation: 769 masl , Location: Weir Right Side ➢ Data Recorder: In control room Monitoring of accelerometer is being carried out every week. From the date of operations, only 02 events recorded by the accelerometer. Both the events were within the safety limits. If any events occur, detail inspection is carried out to ensure the Dam safety. • Regular community consultations and meetings • Continuous liaison with communities by CLOs • Compliance with local norms • Slopes protection measures through third-part experts • Access control to prevent communities from high risk areas • Management of public grievances • Vehicular operation and driver's management as per the TMP for public safety
6	Fisheries Management Plan (FMP)	• Regular interaction and coordination with fisheries departments of AJK & Mansehra (KPK) • Regular interaction and coordination with local fishery expert • Fish breeding grounds / sites were developed at three (03) locations on weir downstream after detailed survey conducted in last quarter through third party fish expert and representatives from fishery departments of AJK and KPK. Contract of work was awarded to third-party fish expert. The work was carried out in coordination with fishery departments. Please refer to **Section 8** for further details.

6. Stakeholder Engagement and Corporate Social Responsibility (CSR)

- No grievance from the local communities was recorded (both at powerhouse and weir site areas) in the reporting period.
- Due to prevailing Covid-19 pandemic situation, no community training and consultation was conducted in the reporting period.

7. Health, Safety and Environment (HSE)

- Compliance with HSE plans is being ensured for staff and public safety. Please refer above the **Section 5**.
- All the fire extinguishers of powerhouse were inspected. Discharged cylinders were replaced with new fire extinguishers.
- Three (03) monthly noise monitoring surveys were conducted by HSE in power complex and nearby community. The noise level was found above the NEQS in process area (at turbine units' areas) while noise level remained within NEQS in other areas. All staff working in the process area have been provided with necessary PPEs (ear-muffs). Increase in noise level depends on unit operation and variation in process parameters / conditions.
- Safety signage containing awareness/information about COVID-19 were procured and placed at visible location in powerhouse. All staff is instructed to follow the precautionary measure mentioned on the safety signages.
- Waste generated during operations at sites is being managed in accordance with environmental and waste management plans. Different color waste bins are placed for segregation of waste. Waste collection and transfer by the waste contractor is in accordance with environmental standards. During the quarter, 4.5 tons of non-hazardous waste was generated. Out of which 71 KG was recycled and remaining waste was taken by waste contractor to government approved waste disposal site. No hazardous waste generated during the reporting period.

- A total of five (05) HSE inspections were conducted in the reporting period. Overall HSE compliance was satisfactory and no major HSE issues were recorded. Some minor issues observed include:

Sr. No	Inspection	Observation	Corrective Action
1.	Fire Extinguisher Inspection	Empty fire extinguishers found at power house site	Refilled fire extinguishers were placed with the empty one. Empty fire extinguishers were sent for the refill.
2.	General Hygiene Inspection	Littering observed around O&M residency	Cleaned the surrounding area of O&M residency, Powerhouse and Korean accommodation
3.	General Hygiene Inspection	Growing weeds observed at powerhouse site residency	Extra weeds were cut down by the civil department.
4.	Electrical Inspection	Some electrical cords found with damaged insulation	Damage cables were replaced with new one
5.	PPEs Inspection at powerhouse	Some staff working without proper PPEs	Given verbal warning and asked them to wear PPEs before entering in the operational area

All aforesaid issues were rectified by the relevant departments.

- Total four (03) HSE training sessions were conducted in the reporting period. Trainings are summarized in the below table:

  Please refer to **Annex-9** for trainings attendance sheets (with training topic and names of participants)

Serial #	Training Topic	Date	No of Participants
01	Welding and cutting safety training	17/04/2020	07
02	Lock out and Tag-out safety training	20/08/2020	06
03	Safe manual handling	21/08/2020	06

- A new contract has been signed between POPL and Qadri enterprises for the year 2020 for the collection of waste and disposal in an environmentally friendly manner in a government approved / designated landfill site.

  .

8. Fish and Vegetation Studies

- Quarterly study to find out the fisheries status of Kunhar river up and downstream, has been carried out in September 2020 for the period July-September 2020. Sampling was done at six fixed points for a comparative result. Findings of the study show that the protection of illegal fishing up and downstream of the dam has not been carried out by the departments of fisheries of AJK and KPK. Local fishermen were also complaining about the use of poison in the river to kill and catch the fish. The low catch of fish during the sampling shows that fish has migrated downstream after breeding upstream. The breeding grounds established in the recent past (March, 2020) have shown the positive results and juvenile fish in the shallow water of the sides of these points clearly indicate the success of these points. The breeding grounds are partially damaged by the flood of August 2020 but still they are functional to a satisfactory level. They need repair and maintenance before the rise of water level in river Kunhar (April 2021). A detailed report is attached as **Annex-3.**

- Quarterly vegetation study for the period July-September has been carried out in September 2020. This study covers the area around powerhouse and dam side. The study shows that the vegetation carried during January-February this year is showing wonderful results. It has covered the vegetated area into a green belt. The plants have got a growth to a very satisfactory level. A tree of Anjeer (Ficus caraca) have given first birth to fruit in just two years of time, which is a wonderful sign of success of the plantation. Protection of the plantation from grazing and browsing of domestic animals is satisfactory and this has improved the vegetation cover. The study envisages that measures will be taken to control ground fire during the dry spell of October-November 2020 for better successful establishment of the vegetative cover. Dam side vegetation is intact but riparian species have been washed away by the floodwater of August 2020. The ornamental plantation carried out on the side of the wall along the road is sixty percent successful which is a very encouraging rate in that type of soil. A detailed report is attached as **Annex-6.**

- The plantation and bioengineering works carried during the planting season of December 2019 to February 2020 is very successful. The eroded part of the slide immediate behind the powers house shows very healthy green picture. This will strengthen the soil stability as the plants grow up and their root system penetrates into

the deep soil. Some fast-growing species like Robinea (Robinea pseudoacacia), drawa (Alianthus anus) have got a good size while mulberry plant (Morus alba) is coming with passage of the time. Narri (Arunda donax) will make a hedge, which will stop the rolling down of the soil or small stones. Once this is established, it spreads through its roots and becomes an excellent soil binder. All these species are local and have no negative impact on the environment.

- The plantation done in the area had a success percentage of above 60 percent, which is very satisfactory. This was only possible with introduction of fertile soil in the pits brought from outside. This soil was placed in between the soft gabions as well to produce good results. The success percentage is very much visible.

9. Livelihood Restoration Program

Apart from the employment to male members of APs, the Company started an initiative to enhance the skills of female members of APs as part of the livelihood restoration strategy.

SHPL implemented programs related to stitching, hand and machine embroidery for females of not only the APS but for the entire villages of neighborhood. To start with, 6-months program in Alda village-AJK (powerhouse area) and 6- months program in Sarati village-KP (weir site) were completed in 2018.

During the year 2019, four programs (3 months each) were conducted in the local communities (AJK and KP). Deedal & Dalola villages in KP area and Patrind and Shoran villages in AJK were the villages where these programs were completed successfully.

This initiative has shown very positive results as the female members of the area are very much satisfied with the programs and suggested to continue the same in future as through this, they not only earn some money but they are now capable to stitch for their families which is a cost saving side of the program.

No new session could be started in the communities due to Covid-19 situation. The sessions will resume once the situation is stabilized.

10.Land Acquisition

Payment status for the land acquisition during the reporting period is presented below. According to the details provided by the revenue departments in AJK and KP 95% and 90% payment has been done in AJK and KP respectively.

Village	Area (Kanal)	Award Amount (PKR)	Disbursed (PKR)	%age	No. of Persons	Persons received payment
1. AJ&K						
A. Land/Property						
Powerhouse (Alda Village AJ&K)	81.80	92,479,824	90,263,154	96.67%	196	612
Head pond (Shoran Village AJ&K)	130.75	75,181,250	74,776,122	99.46%	611	202
Weir + Head pond (Patrind Village AJ&K)	341.10	204,037,798	203,670,449	99.82%		353
Forest land for Surge Tank (Alda village)	47.75					
B. Additional Land/Property						
Weir + Head pond (Patrind Village AJ&K)	3.70	2,127,500	1,955,000	91.89%	3	19
Weir + Head pond (Patrind Village AJ&K)	10.30	6,076,540	5,562,233	91.54%	3	19
Head pond (Shoran Village AJ&K)	4.66	6,054,188	6,054,181	100.00%	3	3
B. Trees						
Alda		1,815,089	1,804,468	99.41%		19
Alda		75,546	75,546	100.00%		3
Shoran		757,391	685,073	90.45%		58
Shoran		106,053	106,053	100.00%	1	1
Patrind		837,882	627,368	74.88%		32
Sub-Total	**620.06**	**389,549,061**	**385,579,647**	**95.00%**	**817**	**1,321**
2. KPK						
Land/Property/Trees						
Weir + Head pond (Sarati Village KPK)	188.70	128,557,081	114,613,320	89.15%	196	Detail Yet to receive
Head pond (Deedal Village KPK)	5.45	3,133,750	Under Acquisition Process		1	Under Acquisition Process
Head pond (Deedal Village KPK)	65.45	37,633,750			16	
Head pond (Dalola Village KPK)	1.40	805,000			1	
Head pond (Naroka Village KPK)	16.30	9,372,500			7	
Sub-Total	**277.30**	**179,502,081**	**114,613,320**	**89.15%**	**221**	**0**

11. Additional Land Acquisition in KP

The status of additional land acquisition has not changed as there has been no progress shown by the revenue department regarding the acquisition process. The land is still in the possession of the owners and their property. The acquisition process will only move forward once the Agreement U/S-41 of LAA 1894 is executed which was submitted to DC Abbottabad office on June 26, 2019 duly signed by the CEO of SHPL. Till date there has been no progress by the revenue department as the cabinet has to authorize the signatory on behalf of GoKP.

We can only share the timelines of sections under LAA-1894 when the Agreement under section-41 is executed which for now (due to pandemic) is clearly uncertain.

12.Photographs


Powerhouse Area Inspection


Fire Extinguishers Inspection


Waste Management


Vegetation Monitoring Study


Fish Monitoring Study


Awareness session on COVID-19 to Mess staff


Awareness session on Safe Manual Handling


Awareness session on Hand and Poer Tools Safety

Annexures

Annex-01 Environmental Flow Data

Environmental Flow Data- 2nd Quarter-2020			
July 2020		August 2020	September 2020
Day / Sensor	Water Flow (m3/s)	Water Flow (m3/s)	Water Flow (m3/s)
1 Day	105.63	136.26	95.29
2 Day	112.03	38.17	24.95
3 Day	146	25.36	80.86
4 Day	120.02	8.38	61.02
5 Day	129.05	3.79	32.21
6 Day	89.72	6.59	23.27
7 Day	72.25	4.56	51.66
8 Day	98.73	11.56	31.34
9 Day	112.35	48.72	21.31
10 Day	108.71	44.44	1.03
11 Day	106.69	39.41	3.71
12 Day	88.87	4.82	4.41
13 Day	53.13	8.36	3.71
14 Day	57.69	36.45	4.42
15 Day	58.92	2.49	4.12
16 Day	77.64	12.09	3.81
17 Day	77.01	28.17	3.81
18 Day	86.21	6.13	3.91
19 Day	96.19	5.54	6.87
20 Day	56.29	41.2	3.94
21 Day	76.01	3.83	5.34
22 Day	55.53	13.47	3.87
23 Day	28.39	7.29	49.61
24 Day	40.04	5.28	68.05
25 Day	25.2	4.27	4.19
26 Day	48.82	34	4.06
27 Day	33.58	24.38	3.98
28 Day	47.31	89.36	8.09
29 Day	31.24	37.44	4.36
30 Day	38.17	3.83	4.31
31 Day	35.81	15.49	95.29

Monthly Discharge Measurement at Bella (Boi)

Sr. No	Month	Flow Reading (Cumecs)	EPA Requirement (Cumecs)
1.	July, 2020	High flow season during 3rd quarter the E-flow data records above then the 3.7	3.7
2.	August, 2020		3.7
3.	September, 2020		3.7

Note: Please refer below to the flow measurement methodology.

Methodology of Discharge Measurement at Bella (Boi)

Weir Downstream

Pakistan Patrind Hydropower Plant

Patrind O&M Private Limited

1. General

Measuring flow using digital current meter involves wading across a stream and taking velocity measurements at multiple places. Both velocity and water depth measurements are taken at the same time and place in multiple locations across the stream.

There are many types of current meters. The cup or propeller types determine flow velocity by the number of revolutions of the cups (or propeller) over a given period of time.

2. Purpose

The main purpose of discharge measurement at Bella (Boi) downstream of weir structure is to verify that enough environmental flow is being released by Patrind hydropower project.

3. Site selection

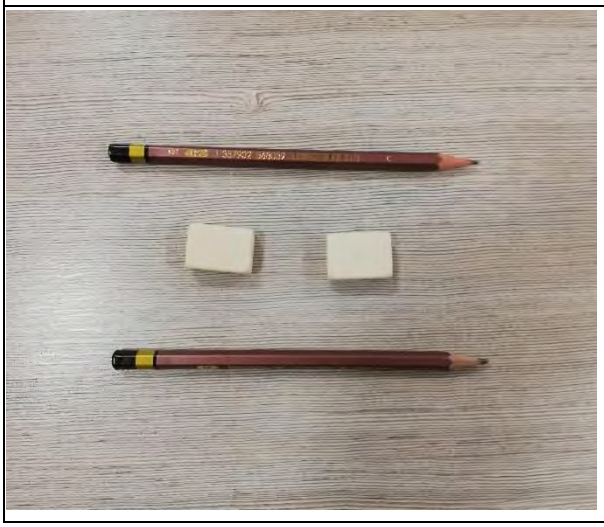
After visiting to several locations, one site i.e. Bella (Boi) has been selected for discharge measurement at weir downstream considering the following aspects.

- The site should be safely accessible and should be in a section of the stream that is free flowing.
- Stream should be straight enough to have uniform form.
- The flow should not be affected by tributaries or tides.

- There should not be any side channels so that all the water flows through the main channel.
- Areas, where there are large boulders, logs, or thick brush which can create eddies, slack water, turbulence or disturbed flow, should be avoided.

4. Equipment

- Measuring tape
- Digital Current Meter
- Top-setting rod (if available) or measuring stick
- Paper and pencil for record keeping
- Waders (waterproof garment)



5. Procedure

1) Tighten a measuring tape across the stream at right angles to the flow. It should be snug and not sag in the middle.
2) Measure the total stream width and record this measurement.
3) Divide the total stream width into equal segments. If the stream is less than 10 feet wide, use ½ foot intervals. For streams greater than 10 feet, use 1 foot or greater intervals.

(Note: The standard method is to divide the width by 20, however ½ foot or 1-foot intervals are sufficient for the purposes of this guide.)

4) Step out to the first measuring point and position the rod. Stand downstream from the measuring tape with the rod next to the tape. The rod should be held vertically, the meter should face upstream and you should be standing off to the side or behind the meter.
5) Record the distance to the bank. Measure total stream depth and record this depth. Multiply the total depth by 0.6 and set the propeller at this depth. (Note: 0.6 times the total depth is considered the point of average discharge in a spot that is less than 2 feet deep. If the depth is greater than 2 feet, two different velocity measurements are required one at 0.2 times the depth and one at 0.8 times the depth.) Read and record the velocity at this depth. (Note: If your meter is attached to a "top setting rod" the propeller can be easily set at this 0.6 depth without calculation by you. Directions on using a top setting rod should be provided by the manufacturer.)
6) Move to the next measuring point and repeat the process. (Note: The standard method is to obtain three velocity measurements at each point and average them.) Make sure to record the distance to the bank, the total stream depth and the velocity at the 0.6 depth for each point across the stream.

6. Calculation & Conclusion

For more accurate results, discharge measurement will be carried out for three times. Following steps will be taken to calculate the discharge at Bella (Boi) downstream of the weir structure.

- Calculate area for each section = width of section x depth of section
- Calculate flow for each section = area of section x velocity of section
- Determine total stream flow = Sum of the flow of each section

Annex-02 Sensors Location

Sensors Location, Photographs and Calibration Certificates

Gauging stations and the reason for selection is given in below table.

Location	Purpose	Installed gauges	Calibration
Kaghan station	Forecasting of floods	Rainfall, Water Level, Temperature	Calibration of each sensor will be on annual basis by third party
Talhata station	Forecasting of floods	Rain & Water Level	
Weir upstream	Monitoring Water flow into reservoir	Water Level	
Reservoir	Monitoring Water flow into reservoir	Rainfall, Water flow, Temp & Humidity, Wind Speed & Direction	
Weir downstream	environmental flow	Rain & Level and e-flow	

❑ Assumption Diagram

❑ Purpose

Kaghan measuring station will be located at 74km upstream side of the weir. The flood from the Kagan station comes into the weir site after 4.5 hours later. Therefore it will provide necessary precaution time against floods situation from upstream of Kunhar river.

❑ Measurement Item

(1) Water Level (Pressure Type)
(2) Rainfall
(3) Air Temperature

5. Talhata Measuring Station

❑ Assumption Diagram

❑Purpose

Talhata measuring station is located at 13km upstream side of the weir. More accurate water flow data can be achieved from this station.

❑Measurement Item

(1) Water Level (Pressure Type)
(2) Rainfall

6. Weir Upstream Measuring Station

❑ Assumption Diagram

❑ Purpose

Weir upstream measuring station will be located at the reservoir inlet. The water level signal from pressure type level transmitter would be converted into flow rate.

❑ Measurement Item

(1) Water Level (Pressure Type)

7. Reservoir Measuring Station

❑ Assumption Diagram

❑ Purpose

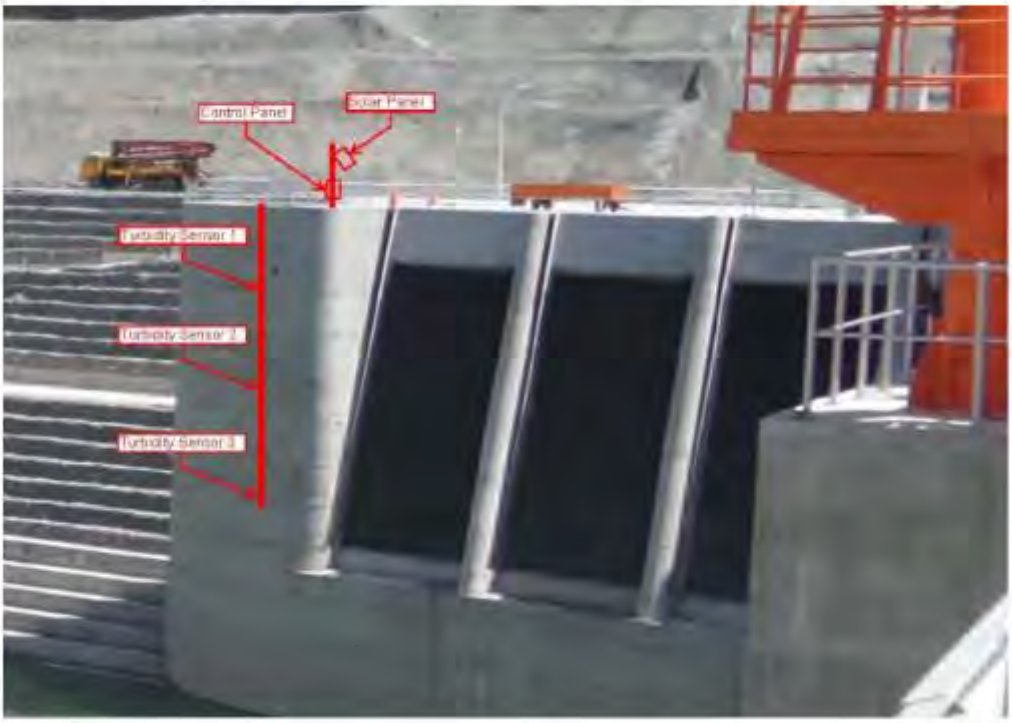
The flow rate into the reservoir will be measured by the flow meter. Doppler type flow meter will be installed at the cofferdam as the section of the upstream cofferdam is a concrete structure and it will not be affected against sedimentation. Although the station is located in the reservoir, the shape is similar to the canal so no turbulence will occurred during the normal operation. Thus, it provides stable measurement.

❑Measurement Item

(1) Water Flow (Doppler Type)
(2) Rainfall
(3) Air Temperature and Humidity
(4) Wind Speed and Direction

8. Weir Intake

❑ Assumption Diagram



❑ Purpose

Weir intake measuring station is located at the weir intake. Total three (3) turbidity sensors measure the turbidity of water into the HRT (Head Race Tunnel). Turbidity sensors are positioned at the high, middle and low points of the intake screen respectively.

❑ Measurement Item

(1) Turbidity (High, Middle, Low Points)

9. Weir Downstream Measuring Station

❑ Assumption Diagram

❑Purpose

Weir downstream measuring station is located at 4km downstream of the weir for the measurement of environmental flow of 2.2 m3/s. As this flow rate is too small for measurement, the water level signal from pressure type level transmitter need to be converted into flow rate. It can be achieved comparing with gate opening rate. The location was decided considering of security against thief.

❑Measurement Item

(1) Water Level (Pressure Type)
(2) Rainfall

10. Flood Warning at Powerhouse

❑ Assumption Diagram

❑ Purpose

Issue a warning alarm for residents to prevent flood damage. Air raid siren will be manually operated by operator before power generation.

❑ Equipment

(1) Air raid siren

11. Flood Warning at Weir

❑ Assumption Diagram

❑ Purpose

Issue a warning alarm for residents to prevent flood damage. The air raid siren will be manually operated by operator before gate operation.

❑ Equipment

(1) Air raid siren

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e: inspectest@inspectest.com.pk www.inspectest.com.pk

Client	Patrind O&M PVT Limited Near Thori Park ,Lower Chotter Muzaffarabad AJ&K, Pakistan
Equipment Detail	Level Transmitter
Model / Type	WL-400-060-XXX
Manufacturer	Global Water Instrument
Serial No	164900469
Code	LT-179
Reference Procedure No.	Call/SCP/055
Job Location	Patrind O&M PVT Limited
Equipment Location	Down Stream

Job No.	11663/23
Data Sheet No.	12-113081
Calibration Date	November 19, 2019
Next Calibration Date	November 19, 2020

Calibration Results

Calibrated by: Muhammad Usman

Range 0~60 Feet

Resolution

Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S
0.00	4.02	3.99	0.12	0.20
15.00	7.76	7.72	15.17	0.28
30.00	11.51	11.44	30.26	0.43
45.00	15.25	15.17	45.31	0.52
60.00	19.00	18.90	60.40	0.67

* Instrument under test

Note(s)

- Instrument is "used" and in good condition on receiving
- No adjustment is carried out and measurements in this certificate are as received figures

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Signature:
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e: inspectest@inspectest.com.pk www.inspectest.com.pk

Client	Patrind O&M PVT Limited Near Thori Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan
Equipment Detail	**Level Transmitter**
Model / Type	**WL-400-060-100**
Manufacturer	**Global Water Instrument**
Serial No.	**1649004693**
Code	**LT-242**
Reference Procedure No	**Cal/SCP/055**
Job Location	**Patrind O&M PVT Limited**
Equipment Location	**Kaghan Station**

Job No	**11663/22**
Data Sheet No	**I2-113080**
Calibration Date	**November 25, 2019**
Next Calibration Date	**November 25, 2020**

Calibration Results — Calibrated by: **Muhammad Usman**

Rang 0~60 Feet — **Resolution**

Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S
0.00	3.95	3.99	-0.16	-0.26
15.00	7.69	7.71	14.89	-0.18
30.00	11.46	11.44	30.06	0.10
45.00	15.20	15.17	45.11	0.18
60.00	18.91	18.90	60.04	0.06

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Approved by:
Signature:
Manager U & T Lab

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e: inspectest@inspectest.com.pk www.inspectest.com.pk

Client	Patrind O&M PVT Limited Near Theri Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan
Equipment Detail	**Level Transmitter**
Model / Type	**MPM-4700**
Manufacturer	**Micro Sensors**
Serial No	**6B3216**
Code	**LT-180**
Reference Procedure No.	**Call/SCP/055**
Job Location	**Patrind O&M PVT Limited**
Equipment Location	**Power Intake**

Job No	**11663/20**
Data Sheet No	**12-113078**
Calibration Date	**November 19, 2019**
Next Calibration Date	**November 19, 2020**

Calibration Results — Calibrated by: **Muhammad Usman**

Range: 0~15 mH2O — **Resolution**

Set Value (Standard) Unit: mH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: mH2O	% Error F.S
0.0	4.07	4.00	-0.06	0.44
3.75	8.07	8.00	3.81	0.44
7.50	12.7	12.00	7.56	0.44
11.25	16.07	16.00	11.31	0.44
15.00	20.06	20.00	15.05	0.37

"Unfavorable under test

Note(s)

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Client	Patrind O&M PVT Limited Near Thori Park ,Lower Chatter Muzaffarabad AJ&K. Pakistan
Equipment Detail	**Level Transmitter**
Model / Type	**MPM-4700**
Manufacturer	**Micro Sensors**
Serial No	**8C6696**
Code	**LT-178**
Reference Procedure No	**Call/SCP/055**
Job Location	**Patrind O&M PVT Limited**
Equipment Location	**Tail Bay Level**

Job No	**11663/19**
Data Sheet No	**12-113077**
Calibration Date	**November 19, 2019**
Next Calibration Date	**November 19, 2020**

Calibration Results — Calibrated by: **Muhammad Usman**

Range: 0~15 mH2O — **Resolution**

Set Value (Standard) Unit: mH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: mH2O	% Error F.S
0.0	3.99	4.00	-0.00	-0.06
3.75	7.98	8.00	3.73	-0.12
7.50	11.97	12.00	7.47	-0.19
11.25	15.97	16.00	11.22	-0.19
15.00	19.96	20.00	14.96	-0.25

Note(s)

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e: inspectest@inspectest.com.pk www.inspectest.com.pk

Client	Patrind O&M PVT Limited Near Thori Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan
Equipment Detail	**Level Transmitter**
Model / Type	**N/A**
Manufacturer	**Global Water Instrument**
Serial No	**N/A**
Code	**LT-242**
Reference Procedure No	**Call/SCP/055**
Job Location	**Patrind O&M PVT Limited**
Equipment Location	**Talahata Station**

Job No	**11663/21**
Data Sheet No	**12-113079**
Calibration Date	**November 20, 2019**
Next Calibration Date	**November 20, 2020**

Calibration Results — **Calibrated by:** **Muhammad Usman**

Range: 0~60 Feet — **Resolution**

Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S
0.00	3.99	13.99	0.00	0.00
15.00	7.74	7.72	15.10	1.15
30.00	11.50	11.44	30.20	0.36
45.00	15.25	15.17	45.30	0.52
60.00	19.00	18.90	60.40	0.67

* Indicated upon test

Note(s)

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Approved by:
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Client	Patrind O&M PVT Limited Near Thori Park ,Lower Chatter Muzaffarabad AJ&K, Pakistan
Equipment Detail	**Level Transmitter**
Model / Type	**WL-400-060-XXX**
Manufacturer	**Global Water Instrument**
Serial No.	**1634002538**
Code	**LT-177**
Reference Procedure No	**Call/SCP/055**
Job Location	**Patrind O&M PVT Limited**
Equipment Location	**Up-Stream**

Job No: **11663/24**
Data Sheet No: **12-113082**
Calibration Date: **November 19, 2019**
Next Calibration Date: **November 19, 2020**

Calibration Results Calibrated by: **Muhammad Usman**

Rang 0-60 Feet Resolution

Set Value (Standard) Unit: FtH2O	Measured Value Unit: mAmp	Standard Value Unit: mAmp	Converted Value Unit: FtH2O	% Error F.S
0.00	4.01	3.99	0.08	0.13
15.00	7.75	7.72	15.13	0.22
30.00	11.48	11.44	30.14	0.23
45.00	15.21	15.17	45.15	0.25
60.00	18.94	18.90	60.16	0.27

* Instrument under test

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Signature
Manager C & T Lab

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Annex-03 Fish Monitoring Study

Fish Monitoring Study

Patrind Hydropower Project Muzaffarabad

Azad Jammu & Kashmir

July-September, 2020

Muhammad Yousaf Qureshi

Director Wildlife & Fisheries ® AJK

Contents

1. Executive Summary

This quarterly fish study is a part of the continued process since September 2013 to assess the impact of damming on River Kunhar. We interrogated the Freshwater Fish Database of Kunhar River to determine whether dam has predictable catchment-scale effects on fish assemblages. Six selected sampling points were examined with defined parameters, four downstream and two upstream of the weir points.

During sampling, it was noticed that the fish has already bread during the first and 2nd week of September. The catch was very low which shows the downstream migration of the fish and concentration in the middle under the boulders. Juvenile fish was examined at the sides of the breeding ground established during the month of March 2020 which shows a very encouraging result of the construction of breeding points. Breeding point one and two were examined and young fish was found on the side stream in shallow water.

The breeding grounds are partially damaged by the high flood during the month of March and water level has risen to the maximum. The stones pitched by the labor are washed away but the boulders are still there. The breeding grounds have served their function as witnessed by the presence of young fish on the sides, which were never seen before.

The water level of the river downstream is to its minimum (2.25CM/S) and colour of the water is transparent. Protection of fish is not seen (Relevant Government Authorities) at this time and some local anglers were found catching fish by line and rod.

The air temperature as on 29th September, 2020 is 28oC and water temperature is 16oC. The low fish catch shows that the fish has migrated downstream and it may come back with the rise in temperature. The next possible breeding time for Shizothorax fish species is April. The Schizothorax fish species are the slow growing fish and they get a size of average 10 cm in a year and get mature for breeding after three to four years of age.

	
Juvenile fish of *Schithorax plagiostomus* found in the shallow water part of the side stream	*Fish breeding ground -1 still intact with large boulders*

2. Introduction

The project of the hydropower is situated in the rugged mountains where speed of River Kunhar is very fast making some cascades. River flow is very high during the summer and low during the winter. Similarly, the turbidity percentage is high during the summer and low during the winter. The study periods are set with the seasonal changes of the river Kunhar so that a clear picture could be obtained for the impact assessment.

The management authority of the Patrind Hydropower Project is very responsible in trying its best to restore the depleted fish population in river Kunhar due to stoppage of fish movement in the river by the construction of dam at Patrind. Now the distance of migration is about 13 km from Domeshi to the weir point at Patrind. The sizeable reduction in the river flow due to water diversion, has affected the downward flow pattern which has ultimately caused the disappearance of breeding grounds for Shizothorax fish species. The construction of new three breeding ground spots will defiantly improve the position and some fish migrating from Domeshi will get a place in1st pool at Boi to breed and some will further migrate above to the 2nd and third breeding pool. These will also compensate the fragmentation in the movement process of the fish to some extent. The fish population in the river is very low at the moment and proper breeding will improve to a certain level and it can be enriched by stocking the fingerlings of the species collected from other rich points of river Kunhar, River Jhelum or River Neelam.

Reservoirs provide significant contributions to fisheries. The main challenges to maintaining and enhancing reservoir fisheries and associated social and economic benefits are fish habitat and environmental degradation, inadequate fish assemblages, inefficient harvesting systems, stakeholder conflicts, and insufficient institutional and political recognition.

View of Breeding spot-2 with visible water flow obstacle of large boulders

3. Objectives of the study

The objectives of the study in relation to dams are of two types. First the conventional objectives which apply to almost all types of dams and secondly specific objectives which apply to the localized conditions of the dams.

These objectives are:

3.1 To maintain stock abundance at high levels.

3.2 To reduce the risk of overexploitation and stock collapse.

3.3 To achieve possible sustainability of production of valued fish species.

3.4 To reduce the impact of the loss of fish biodiversity.

A Fisheries Management Plan had been developed to achieve these objectives in the project area of river Kunhar under the Patrind Project.

4. Methods & Materials

The sampling size covers an area of about 14 km up and downstream. Six sampling points have been fixed for repeated comparable studies. Four sampling points are existing downstream of the weir point and two upstream. The points selected were based on the potential of existence of the fish based on abundance of food ingredients, confluence of side streams and migration possibility of the fish. The team was consisting of fisheries biologist,

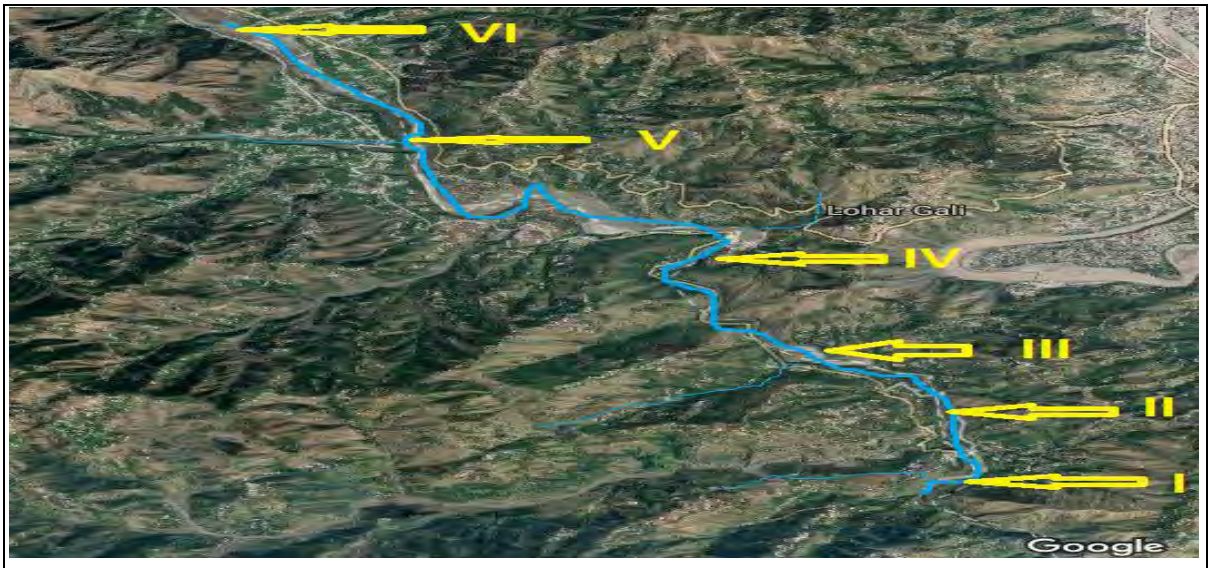
Environmental Officer and a professional fisherman. No support members could be taken on board because of the restrictions imposed due to COVID 19 virus.

Picture showing study area (Points of sampling)

A cast net of 2x2 inch mesh size with a weight of 6 kg has been used and gill net of 1.5x1.5-inch mesh size and 30-meter length was used at Point-IV (Weir) to catch fish. A professional fisherman, Mr. Sajid Mehmood was engaged for catching the fish at the sampling points of the river Kunhar. Electronic balance was used to weigh the caught fish and normal tap to measure the length. pH paper and pH meter were used to measure the hardness and TDS meter was used to measure the total dissolved solid and DO meter for the dissolved oxygen in the stream water. Normal thermometer was used to measure the temperature of the water.

5. Field Results of Sampling points

The points for the sampling are shown in the below image:

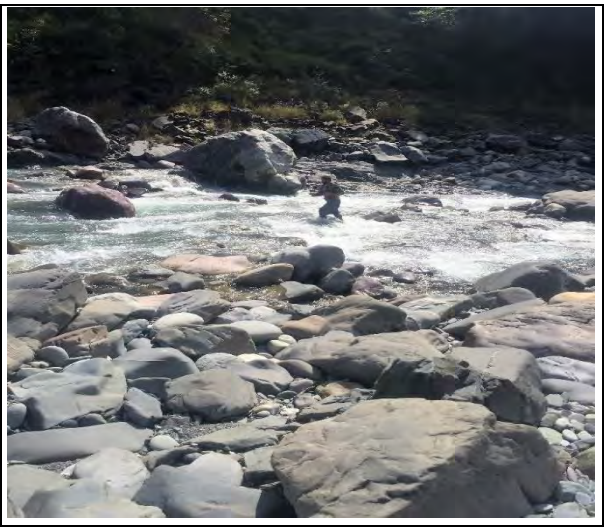


Google site map of Study Area (I-Batangi, II Boi, III Domail, IV Weir, V-Shorran, VI-Dalola)

I. Sampling Point I (Batangi)

This point is situated at 34o18/ 8.12// N 73o26/32.79// E with an altitude of 2371 ft above sea level. The water quantity is at the lowest level and it is transparent. Air temperature is 28oC and water temperature is 16o C. The water flow is more centered and casting of net is very difficult. TDS is 459, and pH is 7. No fish was caught here showing the migration downstream.

Gadgets used to measure water quality parameters.

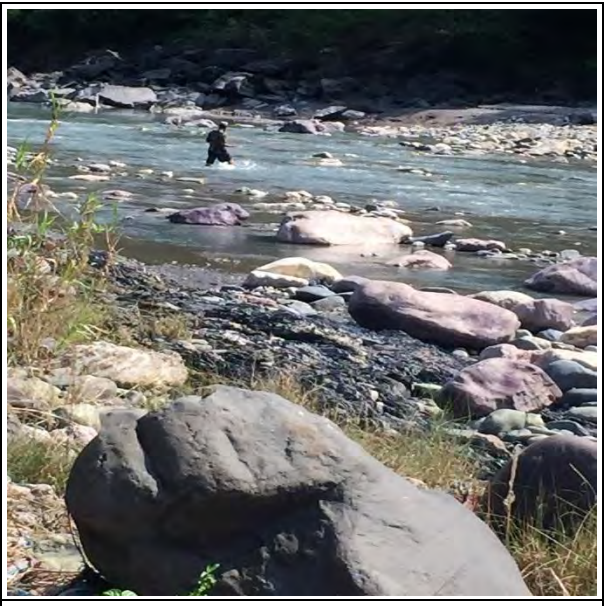


Fisherman casting net in the difficult fishing area

II. Sampling Point II (Boi)

This second sampling point of the study is situated at 34o 18/ 19// N, 73o 26/ 44// E at an elevation of 2422 ft above mean sea level. The first and second breeding points are lying near to this point. New juvenile fish was found in the side small shallow water of the river Kunhar proving the success of the establishment of the breeding grounds for Shizothaorax species. The breeding season was early to mid of September as per the size of the young fish. Watercolor is Transparent with air temperature of 28oC and water temperature 16oC with pH 7. No fish could be caught here for the reason quoted above.

Young fish found at the breeding ground-2



Fish sampling at point-2

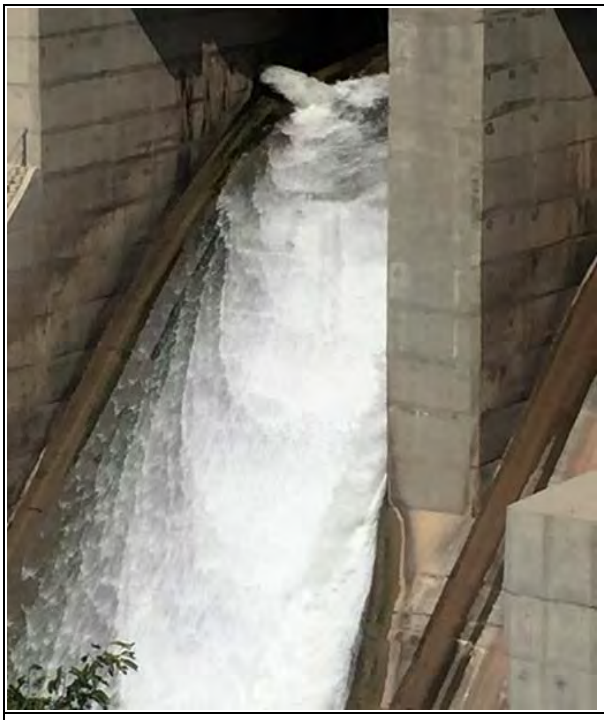
III. Point-III (Domail Boi)

The third point of sampling is Domail at the junction of Nallah Boi with River Kunhar. This point is situated at 34o 18/ 36// N, 73o 26/ 43// E at an elevation of 2398 ft above sea level. The color of the river water and joining Nallah Boi is clear. Air temperature is 28oC and water temperature 16oC. No fish could be caught here. There were three local anglers trying to catch the fish with line and rod. On query, they were of the view that fish catch is very low and some people from outside came just one month before and mixed the poison in the river above this point and caught the fish here. The fish so killed gets contaminated and dangerous for the health. This kills young and mature fish altogether up to a larger distance. There is a need for proper protection of fish in the river.

Local anglers at Domel Juncture of Nallah Boi and river Kunhar

IV. Point IV (Outlet)

Fourth point of sampling is situated at 34º 20/ 30" N and 73º 25/ 43" E. with an elevation of 2519 ft above mean sea level. A Gill net of 30m length and 1-meter width was placed here one day before the sampling day to catch the fish for assessment. Only one *Schizothorax plagiostomus* yearling fish, with weight of 47 grams and length 11cm could be caught here as the breeding season is over and fish has migrated downstream. Further upstream migration of fish is blocked here because of the dam constructed at this point. Water temperature was 16ºC and pH 7.



Controlled E-flow of water at weir

Yearling of Schizothorax plagiostomus

Wood logs collected from the reservoir in August

V. Point-V (Shorran)

This sampling point is at the tail of the reservoir and is situated at 34º 21/ 09// N and 73º 24/ 1// E with an elevation of 2556 ft above mean sea level. The side vegetation has been mostly being cleared by the locals and a road has been constructed for trucks to get loads of sand from here. The air temperature is 28ºC and water temperature was 16ºC with pH 7. No fish could be caught here.

Fish Sampling at point-5

VI. Point VI (Dalola)

This sampling point is situated at 34o 22/ 27// N and 73o 23/ 34// E with an elevation of 780 meters. water temperature is 16oC and pH 7. TDS 376. No fish could be caught here.

Fish Sampling at point-6

6. Water Quality

Parameter	*Point - 1*	*Point- 2*	*Point- 3*	*Point- 4*	*Point- 5*	*Point- 6*
Electrical conductivity (mS)	68	68	69	68	70	71
Temperature (°C)	16	16	16	16	16	16
Air temperature	28	28	28	28	28	28
Dissolved oxygen (mg/L)	9	9	9	9	9.5	10
pH	7	7	7	7	7	7
Total dissolved solids (mg/L)	186	186	190	186	193	187
Transparency	Clear	Clear	Clear	Clear	Clear	Clear
Odor	No	No	No	No	No	No
Taste	No	No	No	No	No	No

7. Discussion

The conservation activity of river ecosystem is absent here. Government Fisheries departments of KPK and AJK have shown lack of any interest as they were approached many times to take interest in conservation and development of reservoir fisheries. Patrind Hydropower project authorities have tried to take on board these departments but their response was not that active. The new fish breeding grounds have shown good results for the presence of young fish in the surrounding shallow water of the area. This has proven the success of the effort of establishing these breeding grounds. This is a very encouraging result within a short spell of time of six months even in the presence of heavy flood of August 2020.

Upstream catch is up to the standards of expectations. The new development of dam near Balakot will disturb the area and fish may disappear here altogether as the fishing pressure by locals is also very high in this area, migration restriction and no remedial actions will deteriorate the water ecosystem.

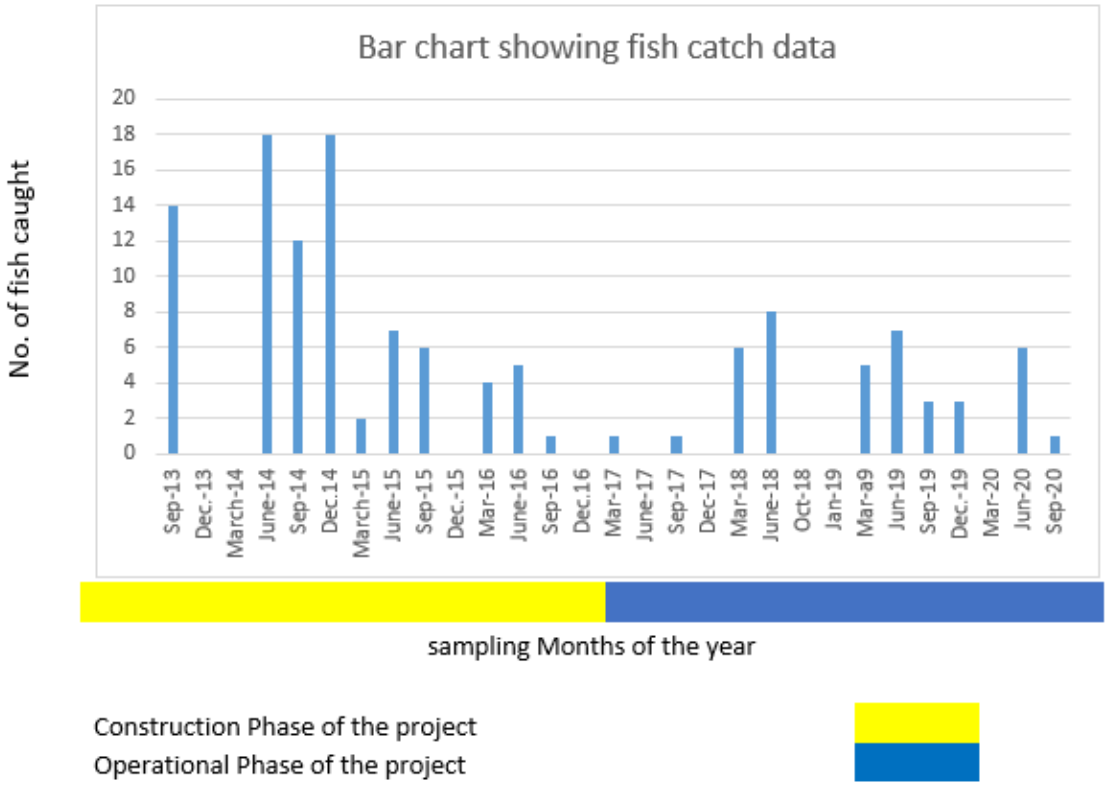
Continuous absence of catch of two other found species (Schizothorax curvifrons and S. dilatata) during the last studies is very alarming. The next studies during the year 2021 will give a better picture of the situation.

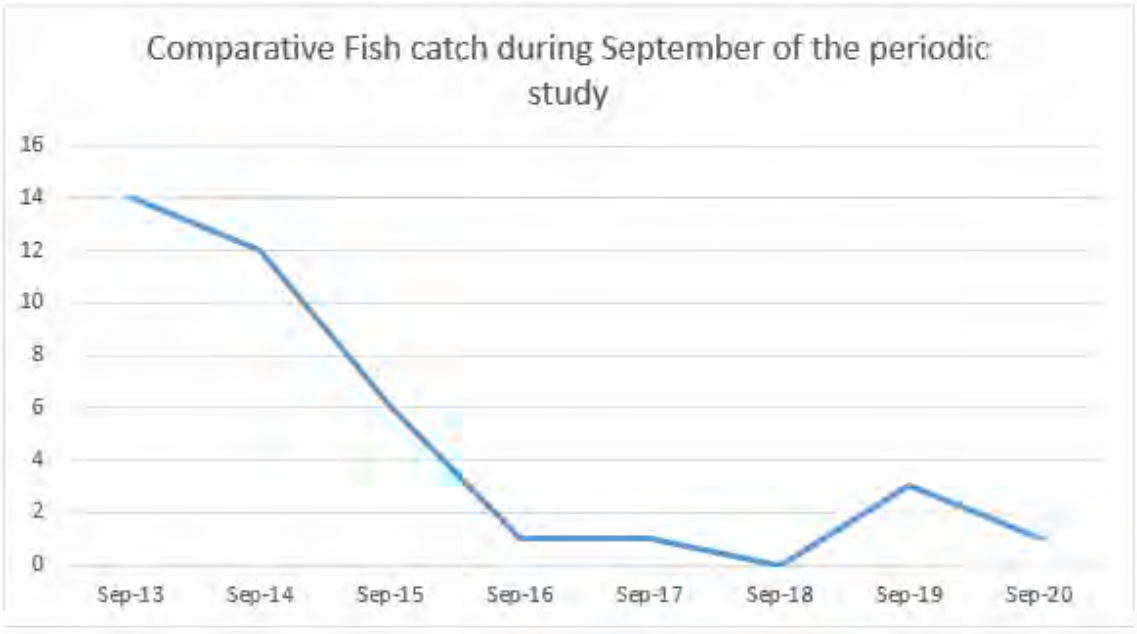
8. Comparative findings and results

The trend of fisheries catch has decreased over the time. The fish catch was high during the first pre dam construction phase. As the dam construction progressed and obstruction came into being, the fish catch has decreased. The table given below reflects the catch of fish of periodic study at six sampling points of the area.

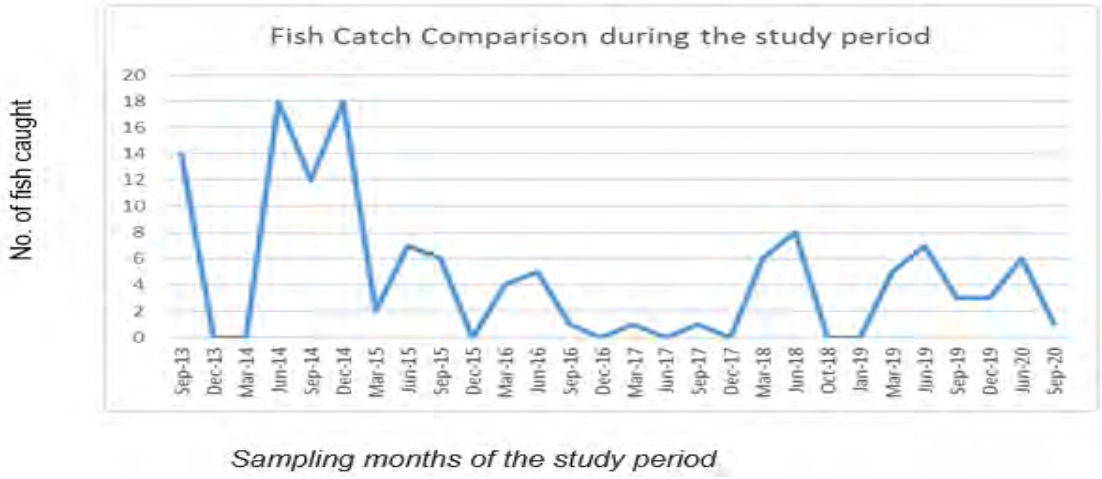
S.#	Study Month	Sampling Point						Total
		1	2	3	4	5	6	
1	September 2013	3	6	4	0	1	0	14
2	December 2013	0	0	0	0	0	0	0
3	March 2014	0	0	0	0	0	0	0
4	June 2014	5	7	4	0	0	2	18
5	September 2014	0	4	1	2	3	2	12
6	December 2014	6	5	0	4	0	3	18
7	March 2015	2	0	0	0	0	0	2
8	June 2015	3	1	1	0	0	2	7
9	September 2015	4	1	1	0	0	0	6
10	December 2015	0	0	0	0	0	0	0
11	March 2016	0	3	3	0	1	0	4
12	June 2016	4	0	0	0	0	1	5
13	September 2016	0	0	0	0	0	1	1
14	December 2016	0	0	0	0	0	0	0
15	March 2017	1	0	0	0	0	0	1
16	June 2017	0	0	0	0	0	0	0
17	September 2017	1	0	0	0	0	0	1
18	December 2017	0	0	0	0	0	0	0
19	March 2018	1	0	1	4	0	0	6
20	June 2018	1	0	0	6	0	1	8
21	October 2018	0	0	0	0	0	0	0
22	December 2018	0	0	0	0	0	0	0
23	April 2019	1	1	0	2	0	1	5
24	June 2019	1	4	1	0	1	0	7
25	September 2019	0	3	0	0	0	0	3
26	December 2019	0	0	0	3	0	0	3
27	June 2020	1	2	0	0	1	2	6
28	September 2020	0	0	0	1	0	0	1

The graphs below show the trend of fish catch over the study period of September 2013 to September 2020





This line graph shows the fish catch trend from 2013 to 2020 during the July-September quarter study period



The line graph above shows the changes in the fish catch. After December 14, the fish catch has reduced as the construction of dam completed during December 2017.

9. Recommendations

- Adequate attention should be given to the conservation of cold-water fish to maintain their gene pool. There is no staff of KPK or AJK Fisheries department for the protection of the area but the project has this facility at a limited level. Both the department should authorize the project staff to exercise the legal provisions of protection in the area. This will also control the illegal methods used for poaching of fish.
- Reservoir Fisheries in captivity should be developed under the project to have a sample model for the departments and local communities to initiate such economic generation activity and best utilization of the existing resource.
- Fish breeding grounds developed during February-March 2020 should be paid special conservation status by putting guards in the area. The guards already deputed should continue their jobs in the protection with special attention in the protection of these spots.
- Repair and maintenance of established fish breeding centers should be carried out every year on regular basis for their efficient function.
- Fingerlings of the native fish should be stocked downstream of the weir in Kunhar river in the months of October and November from the rich areas of Kunhar and Neelam rivers.

10. Acknowledgement

I'm thankful to the organization for having confidence in me and giving me the responsibility of conducting this study. I'm also thankful to them for implementing the recommendations to a maximum level and I hope they will do it with the same spirit in the future

My special thanks to Mr. Atif, Mr. Qamar and Mr. Imran Yousaf for giving me all the support for conducting this study. It would have been extremely difficult to do it without their company and provision of all kind of support to me.

All other staff members of the Patrind Hydropower Project have extended every type of facilitation whenever I came to them. I'm so grateful to all of them.

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Annex-04 Local Employment Status

Employment Summary

Departments	AJK	KPK	Other	Total
CEO				
Service Support	14	4	3	21
Maintenance	13	3	7	23
Operation	17	5	2	24
HSE (inc CLO)	4	1	0	5
Total	**48**	**13**	**12**	**73**
Total %	65.75%	17.81%	16.44%	

Departments	Chatter	Alra	Patrind	MZD	Mirpur	KPK	Other	Total
CEO								
Service Support	6	3	2	3		4	3	21
Maintenance	6	0	0	7		3	7	23
Operation	3	0	2	11	1	5	2	24
HSE (inc CLO)	0	1	1	2		1	0	5
Total	**15**	**4**	**5**	**23**	**1**	**13**	**12**	**73**

Employment from Affected Households

Sr. No	Affected Name (Name initials)	Village	Designation/Working Role	Department
1.	MA	Alda	CLO	HSE
2.	MoA	Alda	Driver	Support Services
3.	TA	Alda	Office Boy	Support Services
4.	I	Sirrati	Driver	Support Services
5.	Z	Patrind	Driver	Support Services
6.	JA	Patrind	Office Boy	Support Services
7.	F	Patrind	Security Guard	Security
8.	S	Patrind	Security Guard	Security
9.	J	Sirrati	Security Guard	Security
10.	U	Sirrati	Security Guard	Security

Sr.NO	Title	Village	Address	Province
1	1st Engineer	Tarbela	House # B-12, R.V.C Tarbela KPK, Pakistan.	KPK
2	Shift Charge Engineer	Chatter	House # B-12, Upper Chattar Housing Scheme Muzaffarabad, Ajk.	AJK
3	Shift Charge Engineer	Mirpur	House # 129-A. Sector F-1, Mirpur, AJK.	AJK
4	Shift Charge Engineer	MZD	Ward # 5, Near Zibah Khana, Eid Gah Road, Muzaffarabad, Ajk.	AJK
5	Shift Control Engineer	MZD	Airport Road, Manak Pian, Muzaffarabad, AJK.	AJK
6	Shift Charge Engineer	MZD	D2 Electricity Colony, Gojra bypass road, Muzaffarabad, AJK.	AJK
7	Shift Control Engineer	Nawsher	S.S House, Karachi Wala Colony,Lower Muhallah Shoaibzai,Nawansher Abbottabad,Pakistan.	KPK
8	Junior Operator	MZD	Village & P.O.Box, Lawat Balla, Tehsil Athmuqam, District Neelum,AJK.	AJK
9	Junior Operator	MZD	Village Kiamanja, Ghari Duppata, Muzaffarabad, AJK.	AJK
10	Sub-Engineer	Thanda Choha	Village Thanda Choha Post Office Nawana Shehr Tehsil and Dist Abbottabad	KPK
11	Senior Charge Engineer	Chatter	House# 13-A, Near MLA Hostel, Lower Chatter, Muzaffarabad, AJ&K	AJK
12	3rd Engineer	MZD	Rasheedabad, Muzaffarabad, AJK	AJK
13	Shift Control Engineer	Bhakar wali	Chak No. 136 RB Bhakrewali Tehsil Chak Faisalabad, Punjab, pakistan	Other
14	Shift Control Engineer	MZD	Ward # 18, Chella Bandi, Muzaffarabad, AJ&K	AJK
15	Junior Operator	Sararti	Sarati Rehmanabad Boi, District Abbbotabad, KPK	KPK
16	Shift Control Engineer	Patrind	Village Patrind, AJ&K	AJK
17	Shift control Engineer	Kumgran	Anderwan Hussain Aghahi house No. 797/3 muhalla kumgaran Multan	Other
18	Sub Engineer (Weir)	Nakra Janderbari	Village Nakra Janderbari P.O. Box Nakra Janderbari Abbottabad	KPK
19	Shift Charge Engineer	Chatter	Upper Chatter Qureshi Muhalla, Muzaffarabad, AJ&K	AJK
20	Junior Operator	MZD	kangar serameel, Muzaffarabad AJK	AJK
21	Block Operator	MZD	Darra Batangi, Muzaffarabad	AJK
22	Junior Operator	MZD	village Sarrar, Muzaffarabad	AJK
23	Block Operator	Patrind	village Patrind, Muzaffarabad	AJK
24	Junior Operator	MZD	P.O.Box Lawat Tehsil Athmuqam, District Neelum,AJK.	AJK

Sr.NO	Title	Village	Address	Province
1	2nd Engineer (Mechanical)	Darya Khan	Farooqabad Darya Khan, Distt. Bhakkar Punjab, Pakistan.	Other
2	2nd Engineer (Electrical)	Abbotabad	House # 377, Link Road, Abbotabad KPK, Pakistan.	KPK
3	3rd Engineer (Mechanical)	Lahore	House # 11-B, Hashmi Street # 17, Tajpura Shad Bagh, Lahore,Pakistan.	Other
4	3rd Engineer(C&I)	Chatter	Near Patrind Hydro Power Project, Lower Chattar, Muzaffarabad Ajk.	AJK
5	3rd Engineer (Electrical)	Abbotabad	CB-500, Emplpyee colony Jhangi seadain,Abbottabad	KPK
6	Sub-Engineer (Mechanical)	MZD	Ward No 18, Chella Bandi, Muzaffarbad, AJK.	AJK
7	2nd Engineer (Civil)	Abbotabad	S.S House, Karachi Wala Colony,Lower Muhallah Shoaibzai,Nawansher Abbottabad,Pakistan.	KPK
8	Sub-Engineer (Civil)	MZD	ward 18, Chella Bandi ,Muzaffarabad,AJK	AJK
9	Senior Officer (Civil)	Chatter	Nisar Karyana Store, Lower Chatter, Muzaffarabad	AJK
10	Officer (Civil)	MZD	Mohala Shahnara, Ward No.14, Muzaffarabad	AJK
11	Sub Engineer (C&I)	Lahore	House No. 78-F1 Model Town,Lahore	Other
12	Foreman(Electrical)	Minwali	Pakki Shahmardan, Mianwali,Pakistan.	Other
13	Foreman (Mechanical)	MZD	Ward#19, Rajpoot House,Mohala Shaukat Lines, Muzaffarabad, AJK	AJK
14	Sub-Technician (Electrical)	Chatter	Lower Chattar, Muzaffarabad, AJK	AJK
15	Technician (Electricial)	Mianwali	Mianwali,Pakistan.	Other
16	Technician (Mechanical)	Bhakar	Daggar Shada, Bhakkar,Pakistan.	Other
17	Crane Operator	Mianwali	Kala Bagh, Mianwali,Pakistan.	Other
18	Sub-Technician (Electrical)	MZD	Mohala Nisar Chela Bandi,Muzaffarabad	AJK
19	Sub-Technician (Mechanical)	MZD	Meeran Kalla Muzaffarabad,AJ&K	AJK
20	C&I Technician	MZD	Ambore, Muzaffarabad	AJK
21	Sub-Technician(C&I)	Chatter	Lower Chattar, Muzaffarabad, AJK	AJK
22	Sub-Technician (Electrical)	Chatter	Upper Chatter Sundgali Ward No 3, Muzaffarabad	AJK
23	Sub-Technician (Mechanical)	Chatter	Ward No.2 Lower Chatter Muzaffarabad AJK	AJK
Sr.NO	**Title**		**Adress**	
1	Sr. Manager	Lahore	Garhi Shaho , Lahore	Other
2	Manager	Lahore	House#485, Nasheman Iqbal housing Socity, Lahore	Other

Sr.NO	Title	Village	Address	Province
3	Senior Officer	Rawalpindi	House#E 65/16, E block Sattlitetown, Rawalpindi	Other
4	Senior Officer	MZD	Dahriyan syedian ward 13, Muzaffarabad	AJK
5	Senior Officer	Chatter	Ward 3, Chatter Domail,muhalla sund Gali, Muzaffarabad	AJK
6	Officer	MZD	Dak-khana Domail,sanwan,Muzaffarabad,AJ&K	AJK
7	Officer	Tili Kot	Tili Kot,Dakhkhana Chinari,Hatian Bala,AJ&K	AJK
8	Driver	Swabi	Swabi Dar Kala.Po box Dobian,Tehsile Lahore,Distt Swabi	KPK
9	Driver	Chatter	Ward No 2, Gazi Chok,Lower Chatter	AJK
10	Driver	Alra	PO Box Muzaffarabad Alra, Tehsil & district Muzaffaraabd	KPK
11	Driver	Patrind	Village Patrind, Muzaffarabad	AJK
12	Driver	Sararti	Village Didal Sarati Po Dulola, Abbottabad	KPK
13	Driver	Chatter	Mohala Lower Chatter, Muzaffarabad	AJK
14	Driver	Chatter	Ward 2, Lower Chatter, Muzaffarabad	AJK
15	Driver	Chatter	Ward No 02, Lower Chatter, Muzaffarabad	AJK
16	Cleaner	Alra	Alra Dakkhana,Muzaffarbad	AJK
17	Cleaner	Alra	PO Box Muzaffarabad Alra, Tehsil & district Muzaffaraabd	AJK
18	Cleaner	Patrind	Dakkhana Muzaffarabad,Patrind, Muzaffarabad	AJK
19	Cleaner	Chatter	Ward No 2, Lower Chatter, Muzaffarabad	AJK
20	1st Cook	Sarati	Burj, Dalola, Abotabad	KPK
21	2nd Cook	MZD	Jaho, Kanynia, Dakkhana Ghari Dupata, Hytia Bala, Ajk	AJK
1	Senior Manager	Swabi	Shah Gram Karokaly P.O madeen , tehsil bahreen, Dist Sawat KPK Pakistan	KPK
2	Senior Officer Environment	MZD	Ward No 18, Chella Bandi, Muzaffarabad, AJK.	AJK
3	Senior Officer HSE	MZD	Majhui,Dakkana Ghari Dupata,Muzaffarabad	AJK
4	CLO	Alra	Alra Muzaffarabad	AJK
5	CLO	Patrind	Village Boi Tehsil & Distt Abbottabad	AJK

CAREER OPPORTUNITIES AT HYDRO POWER PLANT

A hydro power sector company is looking for hire the services of experienced professionals for the following positions for O&M of Patrind Hydro Power Plant:

Sector	Minimum Qualification	Position & Experience
Maintenance	DAE Electronics or Equivalent	Possesses high skill and sound knowledge in all maintenance aspects of hydro Power Plant (HPP). Well versed with operating of HPP facilities (PLC, Excitation, Protection, Sensors, CCTV, Telephone Exchange, and Networking). **(Sub Technician Control and Instrumentation)** Having minimum 2 years of experience in O&M of HPP/CCPP Preference shall be given to HPP personal.
Maintenance	DAE or Equivalent	Possesses high skill and sound knowledge in all maintenance aspects of hydro power plant (HPP). Well versed with operating of HPP facilities (troubleshooting of 0.4kV switchgear,11kV sweatchgear,11kV transmission line and all other electrical facility in Powerhouse). (Elec. Sub Technician) Having minimum 2 years of experience in O&M of HPP/CCPP Preference shall be given to HPP personal
Support Service	BA/BSc. in Business Management or Equivalent	**(Officer -Administration, Finance & Procurement)** Graduation in business management or related field from a recognized university with more than 60% marks.

I. Fluency in written and spoken English is mandatory.
II. Only shortlist candidates will be call for test and interview.
III. Proficient in computer application skills including Word, Excel, Power Point, etc.
IV. Send your latest CV mentioning current & expected salary along with photograph, contact number and current job title to the following: powersector11@gmail.com latest by 31th July 2018 with clear job title in email "subject".

(If the CV has not include information mentioned above, it may be a disadvantage during the document review)

V. Management can cancel any or all positions at any time without prior notice.
VI. Use of any influence during the selection process would immediately result in disqualification of the candidate

Only shortlisted candidates will be contacted.

The company will not respond to any query or email.

Annex-05 Bi-Annual Water Quality Analysis

WATER QUALITY LABORATORY MUZAFFARABAD
Pakistan Council of Research in Water Resources
Ministry of Science & Technology, Government of Pakistan
Shahid Nare Tariq Abid by Pass Road, Muzaffarabad
Office Phone# 05822-920949

WATER QUALITY TEST REPORT

Report Serial No.	WQL-MZD-219-2020	**District Name**	Muzaffarabad
Name of Theme	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-(057)-T06-20	**Client Code**	MCL-057
Sampling Date	28-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Main tank Adda Village		
Client Name & Address	Patrind O&M Private Limited (POPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	PH	–	6.5-8.5 (PSQCA)	6.81
2	Turbidity	NTU	<5 (PSQCA)	< 0.1
3	Total hardness	Mg/l	<500 mg/l (PSQCA)	164.3
4	Total Dissolved Solids (TDS)	Mg/l	1000(PSQCA)	489.3
5	Chloride	Mg/l	250(PSQCA)	31.3
6	Fluoride	Mg/l	1.5(PSQCA)	<0.01
7	Chlorine	Mg/l	0.2-0.5 (PSQCA)	< 0.2
8	Sodium	Mg/l	200 (WHO)	3.05
9	Potassium	Mg/l	10 (PSQCA)	3.16
10	Calcium	Mg/l	100 (PSQCA	41.2
11	Electrical Conductivity	µ s / s	NGVS	694
12	Carbonate	Mg/l	NGVS	0.00
13	Bi-Carbonate	Mg/l	NGVS	458
14	Total Coliforms (PA Kit)	+ive /-ive	Nil (PSQCA)	-ive

PSQCA: Pakistan Standard Quality Control Authority, **P/A:** Presence / Absence, **+Ve:** Presence of Bacterial Contamination, **-Ve:** Absence of Bacterial Contamination, **NGVS:** No Guideline Value Set, **WFP:** water filtration Plant, **WQL:** Water Quality Lab., **BDL:** Below Detection Limit.

Terms & Conditions:

- Test Results in this report relate only to the test items/sample submitted and tested. Tested parameters followed the APHA (American Public Health Association) standard methods, 21st Edition.
- The test report shall not be reproduced except in full, without written approval of WQL-PCRWR.
- Water Quality Parameters exceeding the WHO Drinking Water Guideline values/Recommendations for the drinking Water Quality, third editions, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PSQCA, 2008) are highlighted.

Remarks: Safe Water

Prepared By: ***(Lab. Analyst)***		***Checked By:*** ***(QC Incharge)***	

WATER QUALITY LABORATORY MUZAFFARABAD
Pakistan Council of Research in Water Resources
Ministry of Science & Technology, Government of Pakistan
Shaha Nasir Tariq Abadi by Pass Road, Muzaffarabad
Office Phone# 05822-920849

WATER QUALITY TEST REPORT

Report Serial No.	WQL-MZD-220-2020	**District Name**	Muzaffarabad
Name of Theist	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-FTN-0585-T06-20	**Client Code**	MCL-058
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Natural Spring Lower Chatter		
Client Name & Address	Patriot O&M Private Limited (POPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	PH	—	6.5-8.5 (PSQCA)	7.54
2	Turbidity	NTU	<5 (PSQCA)	< 0.1
3	Total hardness	Mg/l	<500 mg/l (PSQCA)	150.3
4	Total Dissolved Solids (TDS)	Mg/l	1000 (PSQCA)	523.3
5	Chloride	Mg/l	250 (PSQCA)	28.4
6	Fluoride	Mg/l	1.5 (PSQCA)	<0.03
7	Chlorine	Mg/l	0.2-0.5 (PSQCA)	< 0.2
8	Sodium	Mg/l	200 (WHO)	2.14
9	Potassium	Mg/l	10 (PSQCA)	1.12
10	Calcium	Mg/l	100 (PSQCA	41.3
11	Electrical Conductivity	µs/s	NGVS	728
12	Carbonate	Mg/l	NGVS	0.00
13	Bi-Carbonate	Mg/l	NGVS	452
14	Total Coliforms (P/A 0/l)	+ve/-ve	Nil (PSQCA)	-ve

PSQCA: Pakistan Standard Quality Control Authority, P/A: Presence / Absence, +Ve: Presence of Bacterial Contamination, -Ve: Absence of Bacterial Contamination, NGVS: No Guideline Value Set, WFP: water Filtration Plant, WQL: Water Quality Lab., BDL: Below Detection Limit.

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- Water Quality Parameters exceeding the WHO Drinking Water Guideline [illegible] for the drinking Water Quality, third editions, and 2001 National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PAK/PSQCA, 2008) are highlighted.

Remarks: Safe Water

Prepared By: ***(Lab. Analyst)***		***Checked By:*** ***(QC Incharge)***	

WATER QUALITY LABORATORY MUZAFFARABAD
Pakistan Council of Research in Water Resources
Ministry of Science & Technology, Government of Pakistan
Shaho Nara Tariq Abad by Pass Road, Muzaffarabad
Office Phone# 05822-920949

WATER QUALITY TEST REPORT

Report Serial No.	WQL-MZD-771-2020	**District Name**	Muzaffarabad
Name of Tehsil	Muzaffarabad	**Town/ Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-(059)-T06-20	**Client Code**	MCL-059
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Water Storage Tank Patrind Village		
Client Name & Address	Patrind O&M Private Limited (POPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	PH	--	6.5-8.5 (PSQCA)	**7.13**
2	Turbidity	NTU	<5 (PSQCA)	**1.2**
3	Total hardness	Mg/l	<500 mg/l (PSQCA)	**131.3**
4	Total Dissolved Solids (TDS)	Mg/l	1000(PSQCA)	**263**
5	Chloride	Mg/l	250(PSQCA)	**23.3**
6	Fluoride	Mg/l	1.5(PSQCA)	**0.02**
7	Chlorine	Mg/l	0.2-0.5 (PSQCA)	**0.00**
8	Sodium	Mg/l	200 (WHO)	**3.06**
9	Potassium	Mg/l	10 (PSQCA)	**0.1**
10	Calcium	Mg/l	100 (PSQCA	**96.3**
11	Electrical Conductivity	µ / s	NGVS	**681**
12	Carbonate	Mg/l	NGVS	**0.00**
13	Bi-Carbonate	Mg/l	NGVS	**251**
14	Total Coliforms (P/A Kit)	+ive /-ive	Nil (PSQCA)	-ive

PSQCA: Pakistan Standard Quality Control Authority, **P/A:** Presence / Absence, **+Ve:** Presence of Bacterial Contamination, **-Ve:** Absence of Bacterial Contamination, **NGVS:** No Guideline Value Set, **WFP:** water filtration Plant, **WQL:** Water Quality Lab., **BDL:** Below Detection Limit

Terms & Conditions:

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- The test report shall not be reproduced except in full, without written approval of WQL-PCRWR.
- Water Quality Parameters exceeding the WHO Drinking Water Guideline[illegible] for the drinking Water Quality, third addition, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority ([illegible] PPA, 2008) highlighted.

Remarks: Safe Water

Prepared By: (Lab. Analyst)		*Checked By:* (QC Incharge)	

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WATER QUALITY TEST REPORT

Report Serial No:	WQL-MZD-222-2020	**District Name**	Muzaffarabad
Name of Tehsil	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-(060)-196-20	**Client Code**	MCL-060
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Natural Spring Barbeen Village		
Client Name & Address	Patriot O&M Private Limited (PDPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	PH	—	6.5-8.5 (PSQCA)	7.17
2	Turbidity	NTU	<5 (PSQCA)	0.09
3	Total hardness	Mg/l	<500 mg/l (PSQCA)	131.3
4	Total Dissolved Solids (TDS)	Mg/l	1000 (PSQCA)	172.6
5	Chloride	Mg/l	250 (PSQCA)	14
6	Fluoride	Mg/l	1.5 (PSQCA)	0.02
7	Chlorine	Mg/l	0.2-0.5 (PSQCA)	0.00
8	Sodium	Mg/l	200 (WHO)	17
9	Potassium	Mg/l	10 (PSQCA)	0.1
10	Calcium	Mg/l	100 (PSQCA)	55
11	Electrical Conductivity	µ / s	NGVS	293
12	Carbonate	Mg/l	NGVS	0.00
13	Bi-Carbonate	Mg/l	NGVS	253
14	Total Coliforms (PA Kit)	+ive /-ive	Nil (PSQCA)	-ive

PSQCA: Pakistan Standard Quality Control Authority, **P/A:** Presence / Absence, **+Ve:** Presence of Bacterial Contamination, **-Ve:** Absence of Bacterial Contamination, **NGVS:** No Guideline Value Set, **WFP:** water filtration Plant, **WQL:** Water Quality Lab., **BDL:** Below Detection Limit.

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- Water Quality Parameters exceeding the WHO Drinking Water Guideline [illegible] for the drinking Water Quality, third editions, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority ([illegible] PPA highlighted.

Remarks: Safe Water

Prepared By:		***Checked By:***	
(Lab. Analyst)		***(IC Incharge)***	

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WATER QUALITY TEST REPORT

Report Serial No.	WQL-MZD-224-2020	**District Name**	Muzaffarabad
Name of Theisl	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-(062)-206-20	**Client Code**	MCL-062
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Downstream Jhelum River		
Client Name & Address	Patriot O&M Private Limited (POPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	Ph	—	6-9 (PSQCA)	7.31
2	Turbidity	NTU	<5 (PSQCA)	19.3
3	Biological Oxygen Demand	Mg/l	80 (NEQs, 1999)	8.20
4	Chemical Oxygen Demand	Mg/l	150 (NEQs, 1999)	53.1
5	Total Suspended Solids	Mg/l	200 (NEQs, 1999)	38
6	Dissolved Oxygen	Mg/l	—	15.12
7	Total Coliforms (PA Kit)	+ve /-ve	Nil (PSQCA)	-ve

PSQCA: Pakistan Standard Quality Control Authority, **P/A:** Presence / Absence, **+Ve:** Presence of Bacterial Contamination, **-Ve:** Absence of Bacterial Contamination, **NGVS:** No Guideline Value Set, **WFP:** water filtration Plant, **WQL:** Water Quality Lab, **BDL:** Below Detection Limit

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- Water Quality Parameters exceeding the WHO Drinking Water Guideline values (Guidelines for the drinking Water Quality, third editions, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PAKEPPA, 2008) are highlighted

Remarks: Safe water. No total coliforms are found, result is negative when inspected with PA kit

Prepared By: (Lab. Analyst)	*Checked By:* (QC Incharge)

PCRWR Issued on Water Quality Lab Muzaffarabad

WATER QUALITY LABORATORY MUZAFFARABAD
Pakistan Council of Research in Water Resources
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Office Phone# 05822-920049

WATER QUALITY TEST REPORT

Report Serial No.	WQL-MZD-226-2020	**District Name**	Muzaffarabad
Name of Theist	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-(064)-T06-20	**Client Code**	MCL-06/I
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Web Site Reservoir Area		
Client Name & Address	Patrind O&M Private Limited (PCPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limit	Results
1	pH	–	6-9 (PSQCA)	6.23
2	Turbidity	NTU	<5 (PSQCA)	**11.0**
3	Biological Oxygen Demand	Mg/l	80 (NEQs, 1999)	4.2
4	Chemical Oxygen Demand	Mg/l	150 (NEQs, 1999)	16.1
5	Total Suspended Solids	Mg/l	200 (NEQs, 1999)	4.23
6	Dissolved Oxygen	Mg/l	–	4.9
7	Total Coliforms (PA, Kit)	+Ve/-ve	Nil (PSQCA)	-Ve

PSQCA: Pakistan Standard Quality Control Authority, **P/A:** Presence / Absence, **+Ve:** Presence of Bacterial Contamination, **-Ve:** Absence of Bacterial Contamination, **NGVS:** No Guideline Value Set, **WFF:** water Filtration Plant, **WQL:** Water Quality Lab., **BDL:** Below Detection Limit

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- Water Quality Parameters exceeding the WHO Drinking Water Guideline values (Guidelines for the drinking Water Quality, third addition, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PAKEPPA, 2008) are highlighted.

Remarks: Safe from the total coliforms but turbidity exceeds from the permissible limits because of the weather conditions.

Prepared By: ***Checked By:***
(Lab. Analyst) ***(QC Incharge)***

PCRWR Issued on Water Quality Lab Muzaffarabad

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Pakistan Council of Research in Water Resources
Ministry of Science & Technology, Government of Pakistan
Shaikh Nasir Tariq Abad by Pass Road, Muzaffarabad
Office Phone# 05822-420949

WATER QUALITY TEST REPORT

Report Serial No	WQL-MZD-227-2020	**District Name**	Muzaffarabad
Name of Their	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-065 &TM6-10	**Client Code**	MCL-065
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Patrind Village Nalmar Spring		
Client Name & Address	Patrind O&M Private Limited (POPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	PH	–	6.5-8.5 (PSQCA)	7.23
2	Turbidity	NTU	<5 (PSQCA)	1.4
3	Total hardness	Mg/l	<500 mg/l (PSQCA)	141.3
4	Total Dissolved Solids (TDS)	Mg/l	1000(PSQCA)	273
5	Chloride	Mg/l	250(PSQCA)	22.4
6	Fluoride	Mg/l	1.5(PSQCA)	0.03
7	Chlorine	Mg/l	0.2-0.5 (PSQCA)	0.00
8	Sodium	Mg/l	200 (WHO)	3.06
9	Potassium	Mg/l	10 (PSQCA)	0.13
10	Calcium	Mg/l	100 (PSQCA	98.3
11	Electrical Conductivity	µ / s	NGVS	671
12	Carbonate	Mg/l	NGVS	0.00
13	Bi-Carbonate	Mg/l	NGVS	243
14	Total Coliforms (PA Kit)	-ve /-lve	Nil (PSQCA)	-ive

PSQCA: Pakistan Standard Quality Control Authority, P/A: Presence / Absence, +Ve: Presence of Bacterial Contamination, -Ve: Absence of Bacterial Contamination, NGVS: No Guideline Value Set, WFP: water filtration Plant, WQL: Water Quality Lab., BDL: Below Detection Limit

Terms & Conditions:

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- Water Quality Parameters exceeding the WHO Drinking Water Guideline values [illegible] for the drinking Water Quality, third editions, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority (PAK-EPA, 2008) are highlighted.

Remarks: Safe Water.

Prepared By:
(Lab. Analyst)

Checked By:
(QC Incharge)

PCRWR Water Quality Lab. Muzaffarabad

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WATER QUALITY TEST REPORT

Report Serial No.	WQL-MZD-218-2020	**District Name**	Muzaffarabad
Name of Client	Muzaffarabad	**Town / Union Council**	Muzaffarabad
WQL Sample Code	MCL-PTN-0556-T06-20	**Client Code**	MCL-056
Sampling Date	26-Aug-2020	**Reporting Date**	31-Aug-2020
Sampling Site Address	Natural Spring Weir Site Disposal Area		
Client Name & Address	Patriot O&M Private Limited (POPL)		

CHEMICAL & MICROBIOLOGICAL PARAMETERS

Sr.#	Water Quality Parameters	Units	Permissible Limits	Results
1	PH	–	6.5-8.5 (PSQCA)	7.12
2	Turbidity	NTU	<5 (PSQCA)	< 0.1
3	Total Hardness	Mg/l	<300 mg/l (PSQCA)	96.2
4	Total Dissolved Solids (TDS)	Mg/l	1000(PSQCA)	241.3
5	Chloride	Mg/l	250(PSQCA)	11.51
6	Fluoride	Mg/l	1.5(PSQCA)	<0.01
7	Chlorine	Mg/l	0.2-0.5 (PSQCA)	< 0.1
8	Sodium	Mg/l	200 (WHO)	3.15
9	Potassium	Mg/l	10 (PSQCA)	1.15
10	Calcium	Mg/l	100 (PSQCA	23.56
11	Electrical Conductivity	µ/s	NGVS	389
12	Carbonate	Mg/l	NGVS	0.00
13	Bi-Carbonate	Mg/l	NGVS	253
14	Total Coliforms (P/A 820)	+ve /-ve	Nil (PSQCA)	-ve

PSQCA: Pakistan Standard Quality Control Authority, **P/A:** Presence / Absence; **+Ve:** Presence of Bacterial Contamination, **-Ve:** Absence of Bacterial Contamination, **NGVS:** No Guideline Value Set, **WFP:** water filtration Plant, **WQL:** Water Quality Lab, **BDL:** Below Detection Limit

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- Water Quality Parameters exceeding the WHO Drinking Water Guidelines, [illegible] for the drinking Water Quality, third editions, and 2004) National Environmental Quality Standards (1999) and Pakistan Standard Quality Control Authority ([illegible]) are highlighted.

Remarks: Safe Water

Prepared By: ***(Lab. Analyst)***	***Checked By:*** ***(I/C Incharge)***

Annex-06 Vegetation Monitoring Study

Patrind Hydropower Project

Vegetation Monitoring Study

(July-September, 2020)

Muhammad Yousaf Qureshi

Director ® Wildlife & Fisheries Department

Contents

1. Abstract

This is the fifth year of vegetation case study to find out the impact of damming on River Kunhar. The vegetation response upstream and downstream is identical as moisture-loving plants have increased their canopy cover upstream beside the lake and some new plant canopies have appeared on the closed sides of the river where it was a riverbed before the construction of the dam. No impact on the riparian species of the river Kunhar has been observed downstream at the farther areas. Lack of sedimentation or sudden floods will have impact on the plant regeneration and this may destroy it. Opening of the flushing tunnel may leave sediment downstream, which provides a medium of new growth for plants and this vegetation can survive up to the next flooding cycle. The bare vegetation on the bottom of the reservoir has submerged altogether and there is no tree or any plant in the reservoir area but vegetation downstream has found a suitable substratum to grow there as moisture content and rainwater is enough to support the survival and growth of the plants. Plant communities changed rapidly during the first two years of the damming but now they have established and there is no danger of their dieback.

The authorities of the Patrind project are committed to cover the barren areas in the project with proper vegetation, which can protect the landslide and increase the biomass. The landslide protection through vegetation and bioengineering works have been initiated at the base of the hill and gradually covering the upland. The base of the hill is almost stabilized with this work and great change in vegetative cover is visible. The photographs below are showing the difference between the position of the land before and after the intervention carried out in the area.

Initial position of the slide behind the powerhouse

Land position before bioengineering works in the slide

Landslide position after the Bioengineering works in December 2019

Same slide in June 2020 after the growth of vegetation planted, and germination of sown seeds

The area above the treated part is difficult because of its terrain and steep slope. Working will have to be done in this area as well during December 2020 to February 2021. Early works during this year have produced wonderful results and same has to be replicated in the coming season of the works.

2. Introduction

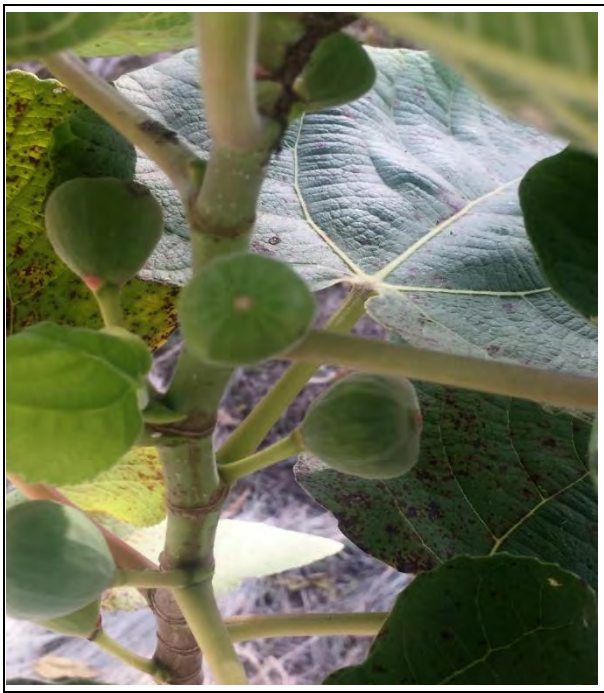
The vegetative cover of the area towards powerhouse needed an improvement process, which has been done by the project authorities for the last few years in the proper season. Plantation has been carried out in the area behind the powerhouse, landslide and area towards the catchment side. This has resulted into the appearance of a vegetative green look and the authorities are thinking to allow tourists in this area as the pristine level has grown up.

The reservoir side of the project has got established with many green belts. Riversides are mostly stabilized and river cut on the sides is seldom seen. The plants germinated at the sides of the river Kunhar are washed away with the increase in the current of water. This August of 2020 has brought a flood and eroded all new germinated plants.

Dense vegetative cover on the side of the River Kunhar

The flood has brought lot of sand and local communities are very happy, as this has provided them the better economic opportunity. Sand from the reservoir has brought blessing for the villagers of Shorran as many dozens of truckloads carry away the sand towards the urban areas of Muzaffarabad and neighboring side.

Powerhouse side has a little difficulty of success in plantation as the base is mostly gravel and dolomite rock type. Fertile soil has already been eroded away in the slide area but the plantation carried out with addition of fertile soil in the pits has given good results and drying up or dying back percentage is low. The erosion process generates when the angle of repose of the hill is disturbed either by human activity or by nature. Control of this erosion needs an early treatment with strengthening the base and giving support to the inclination of the hillside.

	
Fruits on 2 years of Anjeer Plant at powerhouse	Success in the plantation at powerhouse site

The plantation done on the right side of the creek just at banks of the river is successful while middle and left side plantation has been destroyed by the mass movement of the slide

3. Study Site

The weir is constructed on River Kunhar situated at 34020/31" North Longitude 73025/42" East latitude with an elevation of 2500 ft. This study area is covered 6 km upstream and 8 km downstream of this weir point plus area behind the powerhouse near Alda village in AJK at 34o20/06" North Longitude 73o27/08" East latitude with an elevation of 2250 ft. Mean annual precipitation ranges from 50–60 inch, more than 70% of which falls between April and September. Summer in the study area is typically hot, with a mean July maximum of 39°C. Winter is characteristically cool to cold with a mean minimum January temperature of 6°C and extreme winter minimum temperatures as low as −2°C (Metrological Department). The area is lying in scrub and Chir pine zone.

The transition zone between Patrind and Alda physiographic regions are the Scrub to Grassland and is characterized by a gradual change in elevation and a shift from grassland to Chir pine zone with steep slopes and landslides on the Alda side. The rock is of Hazara formation with dolomite, sandstone, limestone and slate. It lies on the fault line and susceptible to high tectonic incidents.

3.1 Objectives

- Immediate objective of the study is to assess the impact of the Patrind Hydropower Project on the vegetation of the area and to restore it by appropriate means.
- To suggest measure to overcome the losses in shape of land erosion and green belts due to the project activities.

4. Vegetation Cover

The dominant species of the area is Chirpine (*Pinus roxburghii*) associated with broadleaved species and bushes. Major associates on the Patrind side are Walnut (*Juglan regia*), Drek (*Melia azedrach*), Phagwarr (*Ficus palmata*). Density of the Chirpine forest behind the powerhouse is quite good with some wide gaps. This is the forest area up to the top of the hill and other side of the hill is private land.

4.1 Plant Species of the area

Following tree species were documented in the project area both in Patrind and in Alda:

Common Name	Botanical Name	Type of Tree	Status
Akhrot (Wallnut)	*Juglans regia*	Fruit	common
Anjeer	*Ficus carica*	Fruit	rare
Batang	*Pyrus patia*	fruit	common
Batculd	*Celtis australis*	soil binder	rare
Beence	*salix spp*	Firewood	common
Ber	*Zizyphus mauritiana*	fruit	common
Chir	*Pinus roxburglii*	Timber	common
Dhaman	*Grewia oppositifolia*	Fodder	common
Drawa	*Ailianthus anus*	firewood	common
Drek	*Melia azadrach*	firewood	common
Kangarr	*Pistacia khunjak*	soil binder	rare
Kau	*Olea cuspidate*	Agri tools,	common
Kiker	*Acacia nilotica*	Firewood	common
Narri	*Arundo donax*	Hedge	common
Nim	*Azadirachata indica*	Firewood	common
Phagwarr	*Ficus Palmata*	soil binder	common
phulai	*Acacia modesta*	firewood	common
Pipal	*Ficus religiosa*	Firewood	common
Robinia	*Robinia pseudoacacia*	firewood	common
Shahtoot	*Morus alba*	Fruit	common
Sherol	*Alnus nitida*	Firewood	common

Snatha	*Dodonaea viscosa*	soil binder	common
Talli (shisham)	*Dalbergia sisso*	furniture wood	common
Toot (mulberry)	Morus albe	Soil binder	common

The main contributor grass species were *Heteropogon contortus* (Sariala), *Cenchrus ciliaris* (Dhaman), *Desmostachya bipinnata* (Dab ghaas), and *Cynodon dactylon* (Khabbal).

Comparatively low vegetation cover was recorded in the flat area and high from steep slope areas (74.29%) followed by gentle slope and gully bed areas.

5. Discussion

The bioengineering works carried out during the planting season of December 2019 to February 2020 is showing a wonderful view as it has stabilized the landslide on right side of the creek. This effort will further improve the position as the root and shoot system of the plants grow to their maturity. Mulberry, poplar, Robinea, Ailanthas and Narri have shown the best results. Germination of Melia and walnut seed is slow but it is taking place.

The bioengineering work carried out is producing good results. The area has been taken in a gradual process for treatment against the erosion.

A wonderful result of the landslide stabilization on right side of the nallah

Narri (Arunda donax) has grown to a better size and developed a hedge, which will further grow and its root system will bind the loose soil to firm green strengthened slope. The bioengineering works were carried out in a gradual process for treatment against the erosion. It needs further intervention during the season of December this year. Another attempt on the right part of the slide will bring safety against the sliding of the hill on powerhouse part of the area. Then left side of the slide should be treated as the finances allow.

Arunda donax (Narri) growing in the slide area

6. OUTCOME OF THIS STUDY

The vegetative cover on the dam side is getting established as the lifestyle of the people have mostly changed in the use of energy resources. The Liquid petroleum gas has mostly replaced the fuel wood. This shows a very good impact on the environmental improvement in the area.

Green patch of the vegetation along the river Kunhar

Downstream of the weir point, riparian plant species change their pattern of growth with the change in water level. Flooding due to seasonal change or flushing of the reservoir wash away all new established vegetation at the immediate side of the river. This flooding also changes the species combination pattern as the roots or seeds of different plants are drifted down by the floods and gets established every time with the water level change.

Slide treatment with wire gabion check dam and soft gabions with sowing and planting before germination

Bioengineering works done on the site show a beautiful patch establishment and hopefully this will give good results next year when the planting, sowing and dibbling carried out in the area show results.

Successful Plantation carried out by SHPL around O&M building


Green patches and plantation in front of O&M building

Different interventions have to be carried out for the rest of the big landslide patches behind the treated one. A cut of drain construction has to be carried out to collect the slide water and drain it into the main channel. Retaining walls, check dams, soft gabions, sodding tufting, sowing planting etc., are the some of the biological and bioengineering techniques to be applied in the entire slide to stabilize it effectively.

7. Recommendations

1. A gradual progress in the landslide stabilization through plantation and bioengineering intervention has shown very good results. This practice should be continued for the next few years till the slide is fully treated and erosion problem goes off.
2. Some gabions have been placed in the wider base of the landslide adjacent to powerhouse but it needs more intensive work with more plantation and bioengineering works so that it could be stabilized.
3. Next planting season of 2020 and 2021 must not be missed and in time actions are required to be taken.
4. Attention should be paid in the months of October and November to take care of the forest fires.

8. Acknowledgment

We are thankful to Patrind Power Generation authority to have their confidence in us for conducting this study and continuous support during the studies time. We are thankful to Mr. Atif, Mr. Qamar and Mr. Imran Yousaf for their full-time company and support during the study. Our special thanks to all those who have been supportive for conducting the studies.

9. References

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Annex-07 Noise Monitoring Report

PATRIND O&M
K-Water Global

Monthly - Noise Survey Report

Date: 4th July, 2020

Sr. No	Location	Type	Time Day/Night	1st Reading db (A)	2nd Reading db (A)	3rd Reading db (A)	Average Reading db (A)	NEQSs db (A)	Remarks
1.	First Floor	Office Area (Commercial)	Day	55.5	61.4	61.9	**59.6**	65	
2.	Ground Floor	Office Area (Commercial)	Day	54.3	59.2	58.1	**57.2**	65	
3.	Basement-1	Process Area (Industrial)	Day	80.3	85.6	84.1	**83.3**	85	The noise level in these areas are above the minimum exposure limits. All staff is instructed to work in the area only when required and use ear plugs. Maintenance department is advised to ensure regular maintenance of the plant equipment's & Operation department is required to ensure the maximum efficiency of operational equipment's as per SOPs
4.	Basement-2	Process Area (Industrial)	Day	82.4	83.9	84.3	**83.5**	85	
5.	Basement-3	Process Area (Industrial)	Day	83.5	86.8	85.7	**85.3**	85	
6.	O & M Building	Residential Area	Day	50.6	53.6	54.7	**52.96**	55	
7.	Korean Accommodation	Residential Area	Day	52.5	50.9	53.9	**52.43**	55	
8.a	Alda Village Point 1 Day Time	Residential Area	Day	50.3	53.6	51.5	**51.8**	55	
8.b	Alda Village Point 1 Night Time	Residential Area	Night	42.8	45.6	45.2	**44.53**	45	
9.a	Alda Village Point 2 Day Time	Residential Area	Day	52.2	54.9	52.7	**53.26**	55	
9.b	Alda Village Point 2 Night Time	Residential Area	Night	40.3	43.9	44.3	**42.83**	45	

Note: 03 turbine are being operated at full capacity 147 MW

Monitored By: Imran Yousaf

Signature:

PATRIND O&M
K-Water Global

Monthly - Noise Survey Report

Date: 16th August, 2020

Sr. No	Location	Type	Time Day/Night	1st Reading db (A)	2nd Reading db (A)	3rd Reading db (A)	Average Reading db (A)	NEQSs db (A)	Remarks
1.	First Floor	Office Area (Commercial)	Day	50.8	54.8	55.6	53.73	65	
2.	Ground Floor	Office Area (Commercial)	Day	47.9	53.4	53.5	51.6	65	
3.	Basement-1	Process Area (Industrial)	Day	84.3	83.9	86.7	84.96	85	The noise level in these areas are above the minimum exposure limits. All staff is instructed to work in the area only when required and use ear plugs. Maintenance department is advised to ensure regular maintenance of the plant equipment's & Operation department is required to ensure the maximum efficiency of operational equipment's as per SOPs
4.	Basement-2	Process Area (Industrial)	Day	89.5	86.3	83.6	86.46	85	
5.	Basement-3	Process Area (Industrial)	Day	88.4	83.4	87.1	86.3	85	
6.	O & M Building	Residential Area	Day	50.4	53.4	52.7	52.16	55	
7.	Korean Accommodation	Residential Area	Day	54.5	56.8	50.8	54.03	55	
8.a	Alda Village Point 1 Day Time	Residential Area	Day	51.6	53.1	52.9	52.53	55	
8.b	Alda Village Point 1 Night Time	Residential Area	Night	43.5	45.6	45.6	**44.9**	45	
9.a	Alda Village Point 2 Day Time	Residential Area	Day	51.8	52.7	51.2	**51.9**	55	
9.b	Alda Village Point 2 Night Time	Residential Area	Night	41.2	43.8	44.6	**43.2**	45	

Note: 03 Turbines are operational at 68 % efficiency and generating 103 MW

Monitored By: Imran Yousaf

Signature:

PATRIND O&M
K-Water Global

Monthly - Noise Survey Report

Date: 23 September, 2020

Sr. No	Location	Type	Time Day/Night	1st Reading db (A)	2nd Reading db (A)	3rd Reading db (A)	Average Reading db (A)	NEQSs db (A)	Remarks
1.	First Floor	Office Area (Commercial)	Day	64.3	64.6	63.4	**64.1**	65	
2.	Ground Floor	Office Area (Commercial)	Day	59.6	67.5	65.5	**64.2**	65	
3.	Basement-1	Process Area (Industrial)	Day	82.3	87.5	86.5	**85.43**	85	The noise level in these areas are above the minimum exposure limits. All staff is instructed to work in the area only when required and use ear plugs. Maintenance department is advised to ensure regular maintenance of the plant equipment's & Operation department is required to ensure the maximum efficiency of operational equipment's as per SOPs
4.	Basement-2	Process Area (Industrial)	Day	89.4	90.4	92.4	**90.73**	85	
5.	Basement-3	Process Area (Industrial)	Day	88.3	92.4	90.5	**90.4**	85	
6.	O & M Building	Residential Area	Day	49.3	53.5	54.7	**52.5**	55	
7.	Korean Accommodation	Residential Area	Day	52.6	55.8	54.9	**54.43**	55	
8.a	Alda Village Point 1 Day Time	Residential Area	Day	50.3	53.2	46.8	**50.1**	55	
8.b	Alda Village Point 1 Night Time	Residential Area	Night	43.5	44.6	43.1	**47.7**	45	
9.a	Alda Village Point 2 Day Time	Residential Area	Day	51.7	52.4	55.2	**53.1**	55	
9.b	Alda Village Point 2 Night Time	Residential Area	Night	42.3	45.3	44.6	**44.06**	45	

Note: 02 Turbines are operational at 37 % efficiency and generating 55 MW

Monitored By: Imran Yousaf

Signature:

Annex-08 Waste Transfer Note

M/s. QADRI ENTERPRISES

PEST CONTROL, WASTE MANAGEMENT & WATER TANK CLEANING SERVICES

Certificate of Waste Management Service

M/S QADRI ENTERPRISES

WASTE COLLECTED FROM PATRIND HYDROPOWER PROJECT WAS DISPOSED OFF AT SHADRA DISPOSAL SITE (GOVERNMENT APPROVED DISPOSAL SITE) AFTER SEGREGATION HAVING PARTICULAR LISTED BELOW:

MONTH OF JULY-2020

WASTE MANAGEMENT SERVICE PARTICULARS

DATE	WASTE TYPE	WEIGHT	RECYCLE WASTE
03- JUL -20	NON HAZARDOUS WASTE	292 KG	20 KG
09- JUL- 20	NON HAZARDOUS WASTE	322 KG	
14- JUL- 20	NON HAZARDOUS WASTE	298 KG	
21- JUL- 20	NON HAZARDOUS WASTE	326 KG	
28- JUL- 20	NON HAZARDOUS WASTE	300 KG	

M/S QADRI PEST & WASTE MANAGEMENT SERVICES ENTERPRISES

AUTHORIZED SIGN STAMP ISSUE DATE 5, AUG, 2020

First Floor, Haji Saeed Plaza, Main Bazar Chowk, Chatta Bakhtawar Park Road, Chak Shahzad Islamabad.

House # A/5, Near Block T, Mustafabad, Nusrat Bhutto Colony, North Nazimabad, karachi

• qadri319@gmail.com
• khanhameed.qadri319@gmail.com
• nishatkhan319@gmail.com

051-8355816 - 8355817
0331-8182097- 0343-8393387
0355-8113085, 0355-8117474,
0346-8182071

M/S QADRI ENTERPRISES

Waste Management Service

Dry, Food, Oily Rags & Recycle Waste According to Waste Tracking From

DRY TRASH					MONTH OF JULY-2020	
Date	5-July-20	10-July-20	15-July-20	24-July-20	29-July-20	TOTAL KG
KG	215	227	210	225	218	1095
FOOD WASTE						
KG	70	84	75	86	69	384
OILY RAGS						
KG	7	11	13	15	13	59
	292	322	298	326	300	1538

Description	DRY	FOOD	OILY REG	TOTAL	RECYCLE
Total Kg	1095	384	59	1538	20

M/s. QADRI ENTERPRISES

PEST CONTROL, WASTE MANAGEMENT & WATER TANK CLEANING SERVICES

Certificate of Waste Management Service

M/S QADRI ENTERPRISES

WASTE COLLECTED FROM PATRIND HYDROPOWER PROJECT WAS DISPOSED OFF AT SHADRA DISPOSAL SITE (GOVERNMENT APPROVED DISPOSAL SITE) AFTER SEGREGATION HAVING PARTICULAR LISTED BELOW:

MONTH OF AUG-2020

WASTE MANAGEMENT SERVICE PARTICULARS

DATE	WASTE TYPE	WEIGHT	RECYCLE WASTE
04- AUG -20	NON HAZARDOUS WASTE	313 KG	27 KG
10- AUG- 20	NON HAZARDOUS WASTE	317 KG	
17- AUG- 20	NON HAZARDOUS WASTE	339 KG	
24- AUG- 20	NON HAZARDOUS WASTE	323 KG	
28- AUG- 20	NON HAZARDOUS WASTE	327 KG	

M/S QADRI PEST & WASTE MANAGEMENT SERVICES ENTERPRISES

AUTHORIZED SIGN STAMP ISSUE DATE 3, SEPT, 2020

First Floor, Haji Saeed Plaza, Main Bazar Chowk, Chatta Bakhtawar Park Road. Chak Shahzad Islamabad.

House # A/5, Near Block T, Mustafabad, Nusrat Bhotto Colony, North Nazimabad, karachi

• qadri319@gmail.com
• khanhameed.qadri319@gmail.com
• nishatkhan319@gmail.com

051-8355816 - 8355817
0331-8182097- 0343-8393387
0355-8113085, 0355-8117474,
0346-8182071

M/S QADRI ENTERPRISES

Waste Management Service

Dry, Food, Oily Rags & Recycle Waste According to Waste Tracking From

DRY TRASH					MONTH OF AUG-2020	
Date	5-July-20	10-July-20	18-July-20	24-July-20	29-July-20	TOTAL KG
KG	220	228	235	225	240	1148
FOOD WASTE						
KG	80	75	98	82	78	408
OILY RAGS						
KG	13	14	11	16	9	63
	313	317	339	323	327	1619

Description	DRY	FOOD	OILY RAG	TOTAL	RECYCLE
Total Kg	1148	408	63	1619	27

M/s. QADRI ENTERPRISES

PEST CONTROL, WASTE MANAGEMENT & WATER TANK CLEANING SERVICES

Certificate of Waste Management Service

M/S QADRI ENTERPRISES

WASTE COLLECTED FROM PATRIND HYDROPOWER PROJECT WAS DISPOSED OFF AT SHADRA DISPOSAL SITE (GOVERNMENT APPROVED DISPOSAL SITE) AFTER SEGREGATION HAVING PARTICULAR LISTED BELOW:

MONTH OF SEPT-2020

WASTE MANAGEMENT SERVICE PARTICULARS

DATE	WASTE TYPE	WEIGHT	RECYCLE WASTE
03- SEPT -20	NON HAZARDOUS WASTE	306 KG	24 KG
10- SEPT- 20	NON HAZARDOUS WASTE	332 KG	
17- SEPT- 20	NON HAZARDOUS WASTE	302 KG	
24- SEPT- 20	NON HAZARDOUS WASTE	324 KG	
28-SEPT - 20	NON HAZARDOUS WASTE	290 KG	

M/S QADRI PEST & WASTE MANAGEMENT SERVICES ENTERPRISES

AUTHORIZED SIGN STAMP ISSUE DATE, 01, OCT, 2020

First Floor, Haji Saeed Plaza, Main Bazar Chowk, Chatta Bakhtawar Park Road. Chak Shahzad Islamabad.

House # A/5, Near Block T, Mustafabad, Nusrat Bhotto Colony, North Nazimabad, karachi

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0355-8113085, 0355-8117474,
0346-8182071

M/S QADRI ENTERPRISES

Waste Management Service

Dry, Food, Oily Rags & Recycle Waste According to Waste Tracking From

DRY TRASH					MONTH OF SEPT-2020	
Date	3-Sept-20	10-Sept-20	17-Sept-20	24-Sept-20	28-Sept-20	TOTAL KG
KG	220	235	217	230	205	1107
FOOD WASTE						
KG	76	84	70	82	75	387
OILY RAGS						
KG	10	13	15	12	10	60
	306	332	302	324	290	1554

Description	DRY	FOOD	OILY REG	TOTAL	RECYCLE
Total Kg	1107	387	60	1554	24

Annex-09 Trainings Attendance Sheets

PATRIND O&M

Training Attendance Sheet

Training Title: LOTO			
Trainer's Name: Sundas Tareen			
Training Location:	Powerhouse	Trainer's Signature:	
Date	20/08/2020	Time	11:00 AM

Sr.	Name	Company	Signature
1	Muhammad Ashfaq	PoPL	
2	Tanveer Butt	PoPL	
3	Javed Abbasi	PoPL	
4	Naeem Qureshi	PoPL	
5	Ghulam Mustafa	PoPL	
6	Sundas Tareen	PoPL	

PATRIND O&M

Training Attendance Sheet

Training Title: Safe Manual Handling			
Trainer's Name: Sundas Tareen			
Training Location:	Powerhouse	Trainer's Signature:	
Date	20/08/2020	Time	11:30 AM
Sr.	Name	Company	Signature
1	Muhammad Ashfaq	PoPL	
2	Tanveer Butt	PoPL	
3	Javed Abbasi	PoPL	
4	Naeem Qureshi	PoPL	
5	Ghulam Mustaf	PoPL	
6	Sundas Tareen	PoPL	

PATRIND O&M

Training Attendance Sheet

Training Title: Welding & Cutting			
Trainer's Name: Sundas Tareen			
Training Location:	Powerhouse	Trainer's Signature:	
Date	27/07/2020	Time	

Sr.	Name	Company	Signature
(1)	Javed Abbasi	POPL	
(2)	Ghulam Mustafa	POPL	
(3)	Tanweer Butt	POPL	
(4)	Nadeem	POPL	
(5)	M. Ashfaq	POPL	
(6)	Sundas Tareen	POPL	
(7)	Sohail	POPL	