Environmental Monitoring Report

PUBLIC

July to December 2023 Report
March 2024

Pakistan: Balakot Hydropower Development Project

Prepared by the Project Implementation Unit of the Pakhtunkhwa Energy Development Organization, for the Islamic Republic of Pakistan and the Asian Development Bank (ADB).

ABBREVIATIONS

ADB	Asian Development Bank
AIIB	Asian Infrastructure Investment Bank
AQMS	Air Quality Monitoring System
CO	carbon monoxide
dB	decibel
DFO	Divisional Forest Officer
EE	Environment Expert
EEM	External Environmental Monitor
EIA	Environmental Impact Assessment
EPC	engineering, procurement and construction
HPP	hydro power project
HSE	health, safety and environment
IRRE	Institute for Research on River Ecology
km	kilometer
KP	Khyber Pakhtunkhwa
MW	megawatt
NEQS	National Environmental Quality Standards
NOC	No Objection Certificate
OHS	occupational health and safety
PD	Project Director
PEDO	Pakhtunkhwa Energy Development Organization
PIU	Project Implementation Unit
PM	particulate matter
PMC	Project Management Consultant
SAEMR	Semi-Annual Environmental Monitoring Report
SDFO	Sub-Divisional Forest Officer
SO_2	sulphur dioxide
SSEMP	Site-Specific Environmental Management Plan
WHO	World Health Organization

TABLE OF CONTENTS

TABLES

FIGURES

ANNEXURES

1 INTRODUCTION

1.1 Preamble

1. This is the fifth Semi-Annual Environmental Monitoring Report (SAEMR) for the Balakot Hydropower Project (HPP, 300 megawatt [MW]) covering reporting period from July to December 2023.

1.2 Headline Information

2. During the reporting period, the detailed engineering design, review of the engineering, procurement and construction (EPC) Contractor's method statements/technical reports, and construction works at the project residential colony, access roads, including R-03, and excavation at adit tunnels remained in progress.

3. Pursuant to the environmental management plan/site-specific environmental management plan (SSEMP) requirements, the EPC Contractor arranged Annual occupational health and safety (OHS) training on August 8 and 9, 2023. The two-day training imparted by professionals of Rescue 1122 of District Mansehra was participated by relevant staff from Project Implementation Unit (PIU), Project Management Consultant (PMC), and the EPC Contractor's health, safety and environment (HSE) staff, along with supervisors from work sites, workshop, and batching plant, etc.

4. To the effect of changes in the: (i) implementation arrangement of the Project-specific Biodiversity Action Plan (BAP) in the area of management; (ii) Project-specific BAP Management Committee revised composition, and (iii) design changes at dam site, the Project Environmental Impact Assessment (EIA) report was updated and submitted to the PIU on August 28, 2023 for their review and onward transmission to the relevant quarters at Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB) for their further review and concurrence.

5. From September 13 to 14, 2023, the ADB safeguard progress review mission held meetings with the PIU, PMC and EPC Contractor, and undertook site visit whereby no major non-compliance was observed at the EPC Contractor's camp and works site(s). In connection with the mission proceedings, on September 18, 2023, the Project HSE portfolio presentation was delivered to the mission with particular emphasis on progress made under Project-specific BAP and consultation with the stakeholders of Basin-wide BAP. It was agreed that PIU will submit findings of the upcoming stakeholder consultation meeting with recommendations for future course of actions to ADB for review and consent In this regard, on November 14 and 17, 2023, two virtual meetings were held with the Basin-wide BAP prospective financiers while minutes of the meetings were shared with ADB on December 12 and 13, 2023 respectively.

6. On September 25 and 26, 2023, the Environment Expert (EE) of PMC undertook due-diligence survey of the muck disposal sites identified by the EPC Contractor. As a result of the survey, out of 10 identified sites, only one site was found suitable subject to construction of protection and drainage works, while the rest of the proposed sites were either found unfeasible or required costly access and huge protection works.

7. Consequent upon ADB's concurrence to the proposed changes in the Project-Specific BAP on May 22, 2023, meetings were held with the Fisheries and Wildlife departments of the government of Khyber Pakhtunkhwa (KP), followed by a field visit on October 19, 2023 in connection with identifying the field offices in the Project area. The field office identified by Fisheries department was found suitable while the Wildlife Department was advised to either establish a field office at the existing Sub-Divisional Forest Officer's (SDFO) Office in Balakot, or identify a new facility at any other appropriate location.

8. On December 6, 2023, the PIU and PMC met with the Director General Fisheries Government of KP and his team in connection with establishing a hatchery in the Project area to comply with the provisions of condition “hh” of the Environmental Approval” of the Project EIA report. A follow up meeting with the Project Director (PD) Balakot HPP (300 MW), and site visit to the Fisheries Department’s proposed site for hatchery were the main outcomes of the meeting.

9. On December 18, 2023, the PIU and PMC jointly delivered a HSE presentation to the ADB environmental safeguards handover mission at PEDO House Peshawar. It was agreed that the PIU will submit the following reports/plans by January 15, 2024: (i) updated EIA report, (ii)Tree Plantation Plan, and (iii) Blasting Management Plan.

10. Although no major non-compliance was observed during the reporting period at the site, the EPC Contractor failed to achieve the Vocational Training milestone set for October 2023.

2 PROJECT DESCRIPTION AND CURRENT ACTIVITIES

2.1 Project Description

11. Balakot HPP (300 MW) is run-of-the river scheme to be constructed on the Kunhar River in its 12 kilometer (km) stretch from Paras to Sangar village in District Mansehra of KP province. Upon completion, 1,143-gigawatt hours of clean energy will be delivered to the national grid yearly.

12. The Project dam site is located in Paras village, around 2 km downstream of the Sukki Kinari HPP (870 MW) tailrace, while the powerhouse site is proposed at Ganhool village of Balakot. The 9.1 km-long headrace tunnel of 8-meter (m) diameter will divert 154 m^3/second design flow of the Kunhar River water to the powerhouse to generate 300 (MW of electricity. The Project residential colony is identified in Sangar village.

13. Access road to the dam and power intake is proposed to off-take from National Highway (N-15) on the left side of the Kunhar River in Paras village.

14. As exhibited in the EPC Contract, following is the brief scope of works:

- Project basic and detailed design
- Temporary works
- Diversion works
- Construction of dam
- Intake structures
- Adit tunnels (adits-01,02 and 03)
- Headrace tunnel
- Surge shaft
- Powerhouse
- Access roads (temporary and permanent)
- Residential colony
- Switchyard
- Transmission line

15. Project brief salient features are given in **Table 2.1** followed by location maps and the Project setting in **Figures 2.1** to **2.5.**

Table 2.1: Brief Salient Features

Hydrology and Design Flows	
River	Kunhar
Catchment area at dam site (km^2)	1939
Design Discharge (m^3/s)	154
Design Flood (m^3/s) T= 10 000 years	3500
Probable Maximum Flood (m^3/s)	5000
Reservoir	
Normal Operation Level (NOL)	1288.0
Minimum Operation Level (MOL)	1283.0
Surface area (at MOL) (km^2)	0.28
Length of Reservoir (at NOL) (km)	2.20
Gross storage capacity (at NOL) ($x10^6\ m^3$)	3.56
Live storage (at NOL) ($x10^6\ m^3$)	1.20
Dam Structure	
Type	Concrete Gravity Arch
Dam crest elevation (masl)	1292.0
Maximum height above river bed (m)	35.0
Maximum height above foundation (m)	58.0
Crest length (m)	130.0
Spillways and Low Level Outlets / Flushing Sluices	
Spillway type	Upper Gated Ogee Crest Spillway + low level Gated Spillway
Upper spillway crest elevation (masl)	1278.0
Upper spillway gates No. and type	3 (radial gates)
Upper spillway gates size (W x H) (m)	11 x 10
Low level spillway invert elevation (masl)	1258.0
Low level spillway gates no. and type	2 (sluice gates)
Low level spillway size (WxH) (m)	6 x 8
Sediment Management	
Sediment Bypass Tunnel type	Gated Intake followed by Archway Tunnel
Intake size (WxH)(m)	7.5 x 4.5
Inlet invert elevation (masl)	1261.0
Tunnel cross section (W x H) (m)	archway (7.5 x 8.0)
Tunnel length (m)	650
Tunnel slope (%)	1.5
Outlet invert elevation (masl)	1248.0
Submerged guiding structure crest elevation (masl)	1272.0
Submerged weir/guiding structure height (m)	21 (estimated maximum above foundation)
River Diversion	
Construction Flood (T= 20 years) (m^3/s)	900
Diversion type	Openings left in the dam body for the low level spillway and a left bank diversion tunnel.
Upstream Coffer dam type	Concrete gravity solution (which will be further converted to guiding structure)
Upstream Coffer dam crest elevation (masl)	1272.0
Downstream Coffer dam type	Concrete gravity solution
Downstream Coffer dam crest elevation (masl)	1252.5
Diversion tunnel type	Archway (concrete lined)
Diversion tunnel no. (-)	1
Diversion tunnel size (WxH) (m)	Archway (7.5 x 8.0)
Diversion tunnel length (m)	650
Diversion tunnel slope (%)	1.5
Diversion tunnel inlet invert El. (masl)	1261.0
Diversion tunnel outlet invert El. (masl)	1248.0
Power Intake Structure	
Intake type	Horizontal intake
Trash rack No.	4
Trash rack size (W x H) (m)	8 x 10

Service gates No.	2
Service gates size (W x H) (m)	4 x 8
Intake crest elevation (masl).	1271
Headrace Tunnel	
Tunnel section	Circular concrete lined (8.0 m inner diameter)
Length up to surge tank (m)	9137
Tunnel slope (%)	0.56%
Upstream Surge Shaft	
Type	Concrete lined circular surge shaft
Internal diameter (m)	14.5
Surge shaft height (m)	122
Surge shaft bottom elevation (masl)	1220.0
Pressure Tunnel/Shaft and Penstock	
Pressure tunnel/shaft main section type and size	Steel lined circular cross section (5.6 m internal diameter)
Pressure tunnel/shaft length (m)	152
Penstock length (m)	88
Branch Section Type	Manifold (3 branches)
Size of each branch (m)	3.2 m internal diameter conduits
Max. Length of branch (m)	~30
Powerhouse and Substation	
Powerhouse type	Conventional underground cavern
Main cavern general dimensions (LxWxH) (m)	71 x 20 x 34
Turbine type	Francis
No. of units	3
Turbine axis elevation (masl)	1054.0
No. of generators	3
Transformer / Substation type	Underground cavern (adjacent to the main powerhouse cavern)
Transformer cavern general dimensions (LxWxH) (m)	88 x 14 x 20
Downstream Surge Shaft	
Type	Concrete lined circular surge shaft
Internal diameter (m)	3
Surge shaft height (m)	244
Surge shaft bottom elevation (masl)	1055.0
Tailrace	
Type	Circular tunnel with transition to an archway section at the final length and Outlet portal
Tunnel section	Circular concrete lined (8.0 m diameter)
Length up to the final transition section (m)	1515
Tunnel slope up to the final transition section (%)	0.23% (ascending slope)
Tunnel final section	Archway concrete lined section (8.0 W x 8.0 H)
Length from transition to outlet (m)	50
Tunnel slope up to the outlet portal (%)	15% (ascending slope)
Power and Energy	
Gross Head (m)	229.0
Design Net Head (m)	217.6
Installed plant capacity (MW)	300 (at the generator)
Mean annual energy (GWh)	1143 (average of 55 years)
Project Access Facilities	
Access road to dam and related structures (length)	550 m (Off taking from National Highway N-15 at the left side of Kunhar River, near Paras village)
Access road to by-pass tunnel (length)	440 m

Figure 2.1: Project Location in Pakistan

Figure 2.2: Project Location in District Mansehra

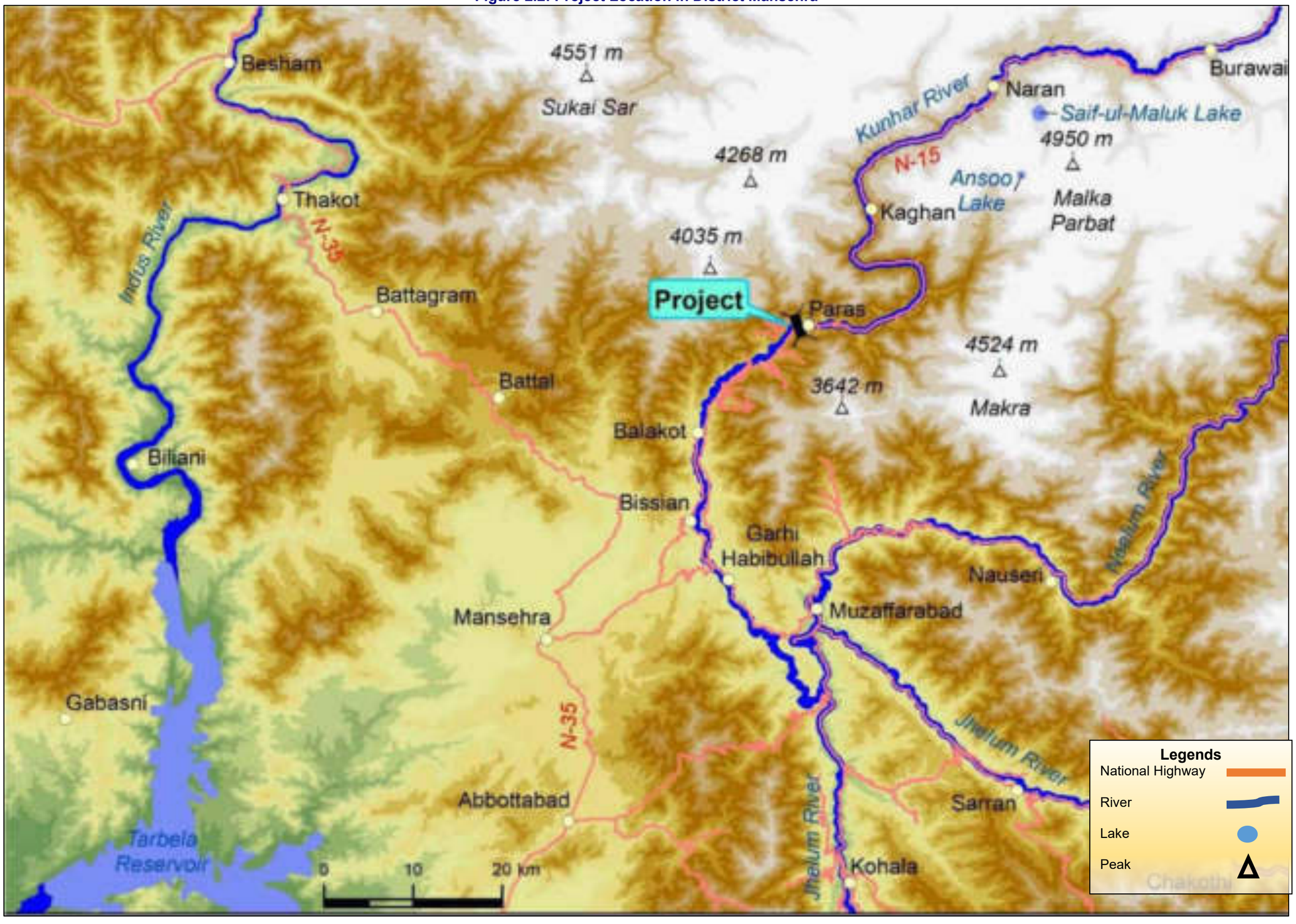


Figure 2.3: Project Layout Map7

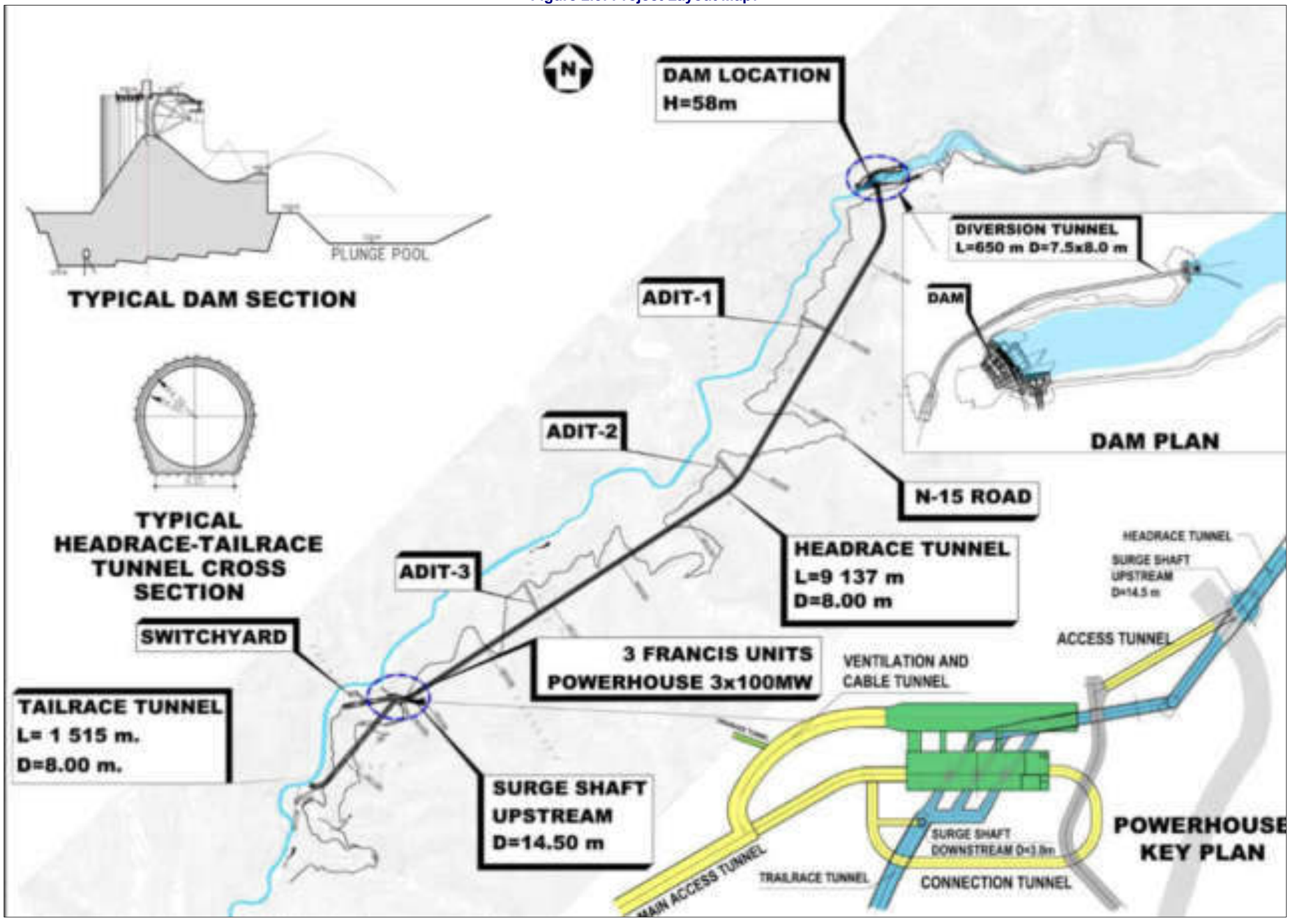


Figure 2.4: Project Setting-Dam site

Figure 2.5: Project Setting-Powerhouse and Colony sites

2.2 Project Contracts and Management

2.2.1 Project Implementation Arrangements

16. Balakot HPP (300 MW) is being implemented through the arrangements in **Table 2.2**.

Table 2.2: Project Implementation Arrangement

Arrangement	Organization/Agency
Funding Sources	• Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB) through a loan to the Government of Pakistan (Loan No: 4057/8397 (AIIB)-PAK) • Government of Khyber Pakhtunkhwa
Executing Agency	Energy and Power Department, Government of Khyber Pakhtunkhwa
Implementing Agency	Pakhtunkhwa Energy Development Organization (PEDO), Government of Khyber Pakhtunkhwa
Project Management Consultant	Joint Venture of: • DOLSAR Engineering Inc. Co. (Turkey) Lead Firm • AGES Consultants • BAK Consulting Engineers • CivTech Associates • Electra Consultants • Techno Legal Consultants (Pvt.) Limited from Pakistan
EPC Contractor	Joint Venture of China Gezhouba Group Company (CGGC), China & Ghulam Rasool and Company Pvt. Ltd (GRC), Pakistan

17. For the Project development, the Government of KP signed a loan agreement with ADB on May 21, 2021 which became effective on July 7, 2021.

18. As AIIB is the co-financier of the Project, theloan agreement was also signed with AIIB which is effective since October 25, 2021.

Consultancy Services Contract Award (2020)

Construction Contract Award (2021)

19. Brief details of the PIU, PMC and the EPC Contractor are given as hereunder.

20. **PIU.** The PIU of Balakot HPP (300 MW), responsible for procurement and supervision of the Project, is currently under establishment by the Implementing Agency (IA), i.e. Pakhtunkhwa Energy Development Organization (PEDO).

21. **Figure 2.6** shows the organogram of the PIU wherein, as exhibited in **Table 2.3,** the PD, Deputy Directors and Assistant Directors along with some of the support staff are already onboard, while procurement of the remaining personnel will be initiated when need arise.

Figure 2.6: PIU Organogram

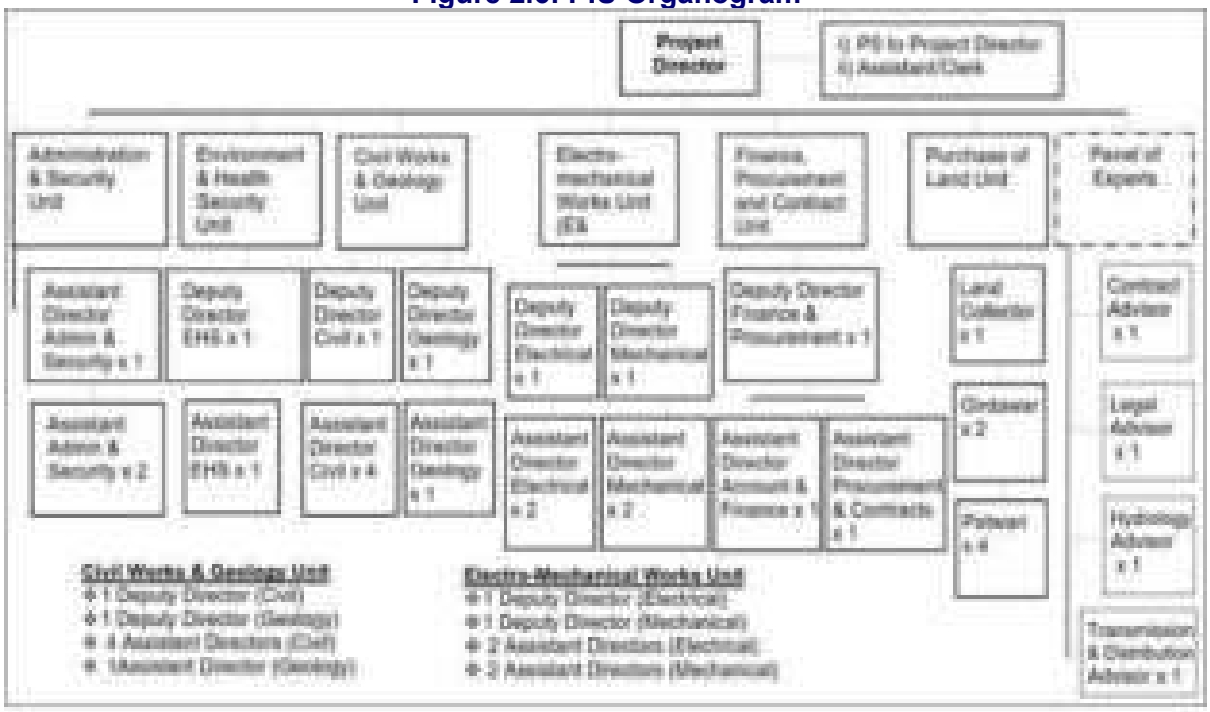


Table 2.3: PIU Staff Deployed During the Reporting Period

Staff Designation	Male/Female	No
Project Director (PD)	M	1
Deputy Director (Civil)	M	2
Deputy Director (Social & Resettlement)	M	1
Deputy Director (Environment Health, Safety and Gender)	F	1
Deputy Director (Finance)	M	1
Deputy Director (Geology)	M	1
Deputy Director (Monitoring and Evaluation)	M	1
Assistant Director (Finance)	M	1
Assistant Director (Electrical)	M	2
Account Assistant	M	1
Land Patwari	M	1
Assistant Director (Social and Resettlement)	F	1

22. As evident from the table above, PIU is headed by the PD with whom the overall responsibility of environmental management and monitoring rests. He is assisted by the Environment and Health Security Unit in matters pertaining to the environmental, health and safety (HSE) aspect of the Project. In this regard, Ms. Ibtesaam Zaima, the Deputy Director, HSE and Gender is onboard since March 2022 with full time inputs and can be reached via:

Phone No: +92-3319844851
Email ID: ibtesaamz@gmail.com

23. The Deputy Director, HSE and Gender will be assisted by an Assistant Director (Social) who joined PIU in the last week of December 2022.

24. Under the provisions of the EPC Contract, the PIU project office was established at the site at the address given below, and is operational since June 2022.

PIU Balakot HPP (300 MW) Site Office
County Hotel, Shohal Najaf Khan
Kaghan Road Balakot
District Mansehra
Khyber Pakhtunkhwa, Pakistan
Phone No. 0997-360003

25. **PMC.** On September 3, 2020, PEDO entered into a Management Consultancy Service Agreement for Balakot HPP (300 MW) with the joint venture (JV) of DOLSAR Engineering Inc. Co. (Turkey), AGES Consultants, BAK Consulting Engineers, CivTech Associates, Electra Consultants, and Techno Legal Consultants (Pvt.) Limited from Pakistan. The JV is led by DOLSAR Engineering Inc. Co. (Turkey).

26. Consultancy services are effective for the duration of 84 months since commencement of services on September 11, 2020. During this period, the JV will provide services specified in the consultancy contract as PMC, and will act on behalf of PEDO as the "Project Manager/Engineer".

27. **Table 2.4** shows chronological order of the procurement of consultancy services.

Table 2.4: PMC Procurement Milestones

S/No	Description	Date
1	Expression of Interest	July 29, 2019
2	Technical & Financial Proposals	November 29, 2019
3	Opening of Financial Proposals	May 19, 2020
4	Contract Negotiation Meetings	August 6 and 07, 2020
5	ADB Comments on / Concurrence to Negotiated Contract	August 25, 2020
6	Signing of Contract for Consultancy Services	September 3, 2020
7	Commencement of Services	September 11, 2020

28. **Table 2.5** exhibits details of the PMC's personnel deployed during the reporting period.

Table 2.5: PMC's Personnel Deployed to the Project

S/No	Designation	Inputs
Expatriate Key Staff		
1	Project Manager - Team Leader	Intermittent
2	Procurement Expert	Intermittent
3	Contract Manager	Intermittent
4	Geotechnical Expert	Intermittent
5	Hydraulics Expert	Intermittent
6	Sediment Management Expert	Intermittent
7	Hydro-Mechanical Expert	Intermittent
8	Electrical Expert	Intermittent
Local Experts		
1	Resident Engineer/Deputy Team Leader	Full Time
2	Chief Engineer (Dam & Surface Works)	Full Time
3	Chief Engineer (Underground Works)	Full Time
4	Electricity Tariff and Power Purchasing Agreement Expert	Intermittent
5	Quality Assurance Engineer (Dam & Surface Works)	Full Time
6	Civil Engineer (Tunnel)	Full Time
7	Quality Assurance Engineer (Underground Works)	Full Time

S/No	Designation	Inputs
8	Transmission Line Engineer	Intermittent
9	Contract Specialist	Full Time
10	Health and Safety Monitor	Full Time
11	Resettlement Expert	Intermittent
12	Gender/Community Mobilization Expert	Intermittent
13	Environment Expert	Intermittent
14	Document Controller (Monitoring)	Full Time
15	Geologist A	Full Time
16	Geologist B	Full Time
17	Structures Engineer	Intermittent
18	Site Inspector (Dam and Surface Works)	Full Time
19	Site Inspector (Dam and Surface Works)	Full Time
20	Site Inspector (Dam and Surface Works)	Full Time
21	Site Inspector (Underground Works)	Full Time
22	Site Inspector (Underground Works)	Full Time
23	Planning Engineer	Full Time
24	Laboratory Technician	Full Time
25	Laboratory Technician	Full Time
26	Laboratory Technician	Full Time
27	Laboratory Technician	Full Time
28	Cost / Time Controller	Full Time
29	Architect	Full Time
30	Pool of Junior Engineer	Full Time
31	Pool of Junior Engineer	Full Time
32	Pool of Junior Engineer	Full Time
33	Pool of Junior Engineer	Full Time
34	Pool of Junior Engineer	Full Time
35	CAD Operator	Full Time
36	Resettlement Assistant	Full Time
37	Junior Geologist	Full Time
38	Junior Geologist	Full Time
39	Office Manager	Full Time
40	Accountant	Full Time
41	Office Assistant	Full Time
42	Office Assistant	Full Time
43	Accounts Assistant	Full Time
44	Computer Operator	Full Time
45	Computer Operator	Full Time
46	Patwari	Full Time

29. Since commencement of the consultancy services, Engineer Assad Ali Khan, the PMC's EE is onboard with intermittent inputs. The EE can be approached through:

Phone No: +92-3369555505

PMC official email ID: dtlbalakothpp@yahoo.com

30. Also, the Health and Safety Monitor, Mr. Syed Ali Fawad Shah, who joined PMC on December 27, 2022, can be reached via:

Phone No: +92- 3331162119
PMC official email ID: dtlbalakothpp@yahoo.com

31. The PMC has established two offices in the Project area and at theite at the address given below. These offices are operational since June 2022 and August 2023, respectively.

PMC Office in the Project Area
Four Seasons Hotel, Near PTCL Exchange
Kaghan Road Balakot
District Mansehra
Khyber Pakhtunkhwa, Pakistan
Phone No: +92-997-360155

PMC Site Office
Royal Paras Hotel, Opposite Sohail Filling Station,
Kaghan Road Paras, Tehsil Balakot
District Mansehra
Khyber Pakhtunkhwa, Pakistan
Phone No: +92-997-360155

32. **EPC Contractor.** The construction contract of Balakot HPP (300 MW) was awarded to the JV of China Gezhouba Group Company (CGGC), China & Ghulam Rasool and Company Pvt. Ltd (GRC), Pakistan on Marh 9, 2021.

33. Consequent upon fulfillment of the requisite conditions of the EPC Contract, PEDO notified September 27, 2021 as Effective Date for the EPC Contract.

34. Various milestones achieved during procurement process of the EPC Contract are in Table 2.6.

Table 2.6: EPC Contract Procurement Milestones

S/No	Description	Date
1	Invitation for Bids	November 23, 2019
2	Site visit to Bidders	December 10, 2019
3	Pre-Bid Meeting	December 13, 2019
4	Bid Submission	June 15, 2020
5	Technical Bid Opening	June 15, 2020
6	Financial Bid Opening	December 15, 2020
7	Notification of Award	February 10, 2021
8	Contract Signing	March 09, 2020
9	Effective Date	September 27, 2021

35. The EPC Contractor's environmental obligations are mainly specified in Volume-01 of 07 (Appendix-9) and Volume-03 of 07 (GCC & SCC) of the EPC Contract.

36. Under the provisions of the conditions of contract, preparation of the SSEMP is one of the EPC Contractor's contractual obligations. Although SSEMP will primarily be based on the essence of the approved EIA report and site requirements, due preference will also be given to the Safeguard Policy Statement 2009 guidelines and conditions contained in the "Environmental Approval" granted by the Khyber Pakhtunkhwa Environmental Protection Agency (KPEA) on July 6, 2021.

37. During all three phases of the Project, i.e. pre-construction, construction, and defects liability period, the EPC Contractor will take care of the HSE portfolio through implementing measures proposed in the SSEMP, good practices, and instructions issued or filling gaps identified in the monitoring reports during the contract.

38. **Figure 2.7** exhibits the EPC Contractor's HSE organogram followed by Table 2.7 showing details of the HSE team onboard so far.

Figure 2.7: EPC Contractor' HSE Team Organogram

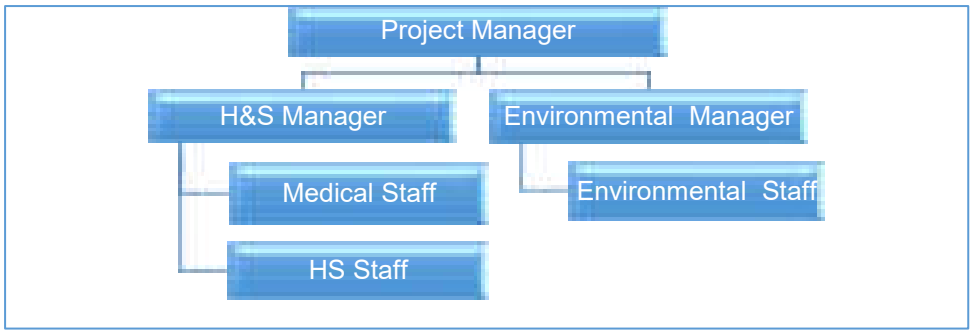


Table 2.7: EPC Contractor's HSE Team

S/NO	Name	Designation	Duty Station	Contact Number
1	Qi Ziu Feng	Health andSafety Manager	Site and office	+92-326-8116666
2	Irshad Saeed	Environmental Manager	Site and office	+92-305-9028481
3	Wang He	HSE Officer	Site and office	+92-307-5552090
4	Guang Jiongji	QHSE Officer	Site and office	+92-307-5552129
5	Wang Zhen	HSE Officer	Site and office	+92- 346 8500824
6	Syed Babar Ali	HSE Officer	Site and office	+92-344-9661669
7	Zaigham Shah	HSE Officer	Adit-01(Kawai)	+92-324-9191434
8	Saeedul Haq	HSE Officer	Adit-02 (Ganhool)	+92-346-8292024
9	Momin Khan	HSE Officer	Adit-03 (Kholian)	+92-315-1855378
10	Syed Hassan Shah	HSE Officer	Dam Site (Paras)	+92-3432152402

2.2.2 Project HSE Safeguard Team

39. From the details given under above, the HSE personnel responsible for the HSE safeguards are detailed in **Table 2.8**.

Table 2.8: Details of HSE Personnel

Organization	Job Title	Name	Contact Details
ADB	Senior Environmental Specialist (Country Environment Focal)	Nurlan Djenchuraev	ndjenchuraev@adb.org
	Environmental Specialist – regional technical assistance consultant	Abdul Hadi	ahadi.consultant@adb.org
PIU	Deputy Director HSE and Gender	Ibtesaam Zaima	ibtesaamz@gmail.com
PMC	Environmental Expert	Assad Ali Khan	dtlbalakothpp@yahoo.com
	Health and Safety Monitor	Fawad Ali Shah	
EPC Contractor	Qi Ziu Feng	H & S Manager	453680735@qq.com
	Irshad Saeed	Environmental Manager	cggcbjstbalakot@126.com
	Wang He	HSE Officer	
	Guang Jiongji	HSE Officer	
	Wang Zhen	HSE Officer	
	Syed Babar Ali	HSE Officer	
	Zaigham Shah	HSE Officer	
	Saeedul Haq	HSE Officer	
	Momin Khan	HSE Officer	
	Syed Hassan Shah	HSE Officer	

2.3 Project Activities during Current Reporting Period

40. During the reporting period, construction works at the Project residential colony, access roads,including access road at dam site, excavation at adit tunnels and installation of batching plant at Adit-03 site remained in progress.

41. **Table 2.9** summarizes the EPC contract and overall works progress achieved so far. **Table 2.10** exhibits component-wise progress achieved till end of the reporting period against planned targets.

Table 2.9: Summary of Overall Progress of EPC Contract till End of the Reporting Period

Contract Signing	SSEMP[1] Approval	Personnel		Civil Works[2]		Progress as of	
		Environmental Manager	Health and Safety Manager	Start	End	June 30, 2023	December 31,2023
March 9, 2020	December 30, 2022	Irshad Saeed	Qi Xiu Feng	September 28, 2022	January 1, 2027	6.21%	8.60%

Table 2.10: Component-wise Summary of Progress till End of the Reporting Period

Description	Planned Start	Planned Finish	Planned %age	Achieved % Progress
Preparatory works	28-Aug-21	27-Feb-23	100%	
Basic Design	21-Sep-21	27-Sep-22	100%	
Detail Design	25-May-22	26-Dec-27	28%	
Procurement & Production & Test & transportation	20-Jul-22	30-May-26	37%	
River Diversion	1-Oct-22	27-Nov-23	100%	
Concrete Dam	19-Jun-23	27-Jan-27	14%	
Power Intake Works	28-Jan-23	28-Jul-24	61%	
Headrace Tunnel	13-Oct-22	27-Jun-26	32%	
Upstream Surge Tank, Pressure Shaft & Penstocks	23-Apr-23	28-Jul-25	38%	
Main Access Tunnel & Ventilation and Cable Tunnel	16-Nov-22	19-Oct-25	28%	
Powerhouse Works	4-Jan-23	29-Dec-25	22%	
Tailrace Tunnel Downstream Surge Shaft	25-Jul-23	27-Feb-26	16%	
Switchyard	19-Apr-23	15-Jan-24	62%	
Transmission Line Works	28-Sep-22	27-Aug-25	43%	
Main transformers and other equipment installation	1-May-23	30-Nov-23	0%	
Road and Bridge	1-Oct-22	3-Oct-26	21%	
Permanent Staff Residential Colony	26-Jun-23	28-Dec-25	20%	
Erection of Unit 2,3	29-Apr-26	29-May-27	0%	
Completion & Taking-over	25-Sep-27	28-Dec-27	0%	

42. The manpower deployed at Site during the reporting period is in **Table 2.11**, followed by staff deployment trend in **Figure 2.8.** The total workforce deployment since commencement of works is in **Figure 2.9.**

Table 2.11: Manpower Deployed to the Project during Reporting Period

S/No	Staff	Reporting Month					
		Jul	Aug	Sep	Oct	Nov	Dec
1	Project Manager	1	1	1	1	1	1
2	Planning, Engineering &Technical Director (DPM)	1	1	2	2	2	2
3	QHSE Director (DPM)	1	1	1	1	1	1
4	Contract and Commercial Director (DPM)	1	1	1	1	1	1
5	Equipment and Material Director (DPM)	1	1	1	1	1	1
6	Deputy Director of Technical &Planning	1	1	1	1	1	1
7	Deputy Director of Contract and Commercial	1	1	1	1	1	1
8	Administrative Director of Administrative	1	1	1	1	1	1

[1] The SSEMP, approved by the Employer, contained Emergency Response Plan and COVID-19 safeguard provisions.

[2] The start and end dates of the civil works are those contained in the last approved Program of Work (Work Schedule).

S/No	Staff	Reporting Month					
		Jul	Aug	Sep	Oct	Nov	Dec
9	Environmental Manager	1	1	1	1	1	1
10	Contract and Commercial Management Department	5	6	6	5	5	10
11	Planning, Engineering and Technical Management Department	10	11	13	12	12	14
12	QHSE Management Department	7	8	9	9	11	14
13	Equipment and Materials Department	8	10	10	15	15	15
14	Financial Management Department	3	3	3	2	4	4
15	Administration & Human Resources Department	20	20	28	35	35	40
16	Mechanical Operators and Driver Team	35	45	49	67	82	90
17	Surveyor Team	5	8	8	8	10	10
18	Laboratory Team	4	4	4	8	8	9
19	General Team ElectricityWater supply A-02&A-03	30	35	35	45	40	45
20	A3 Camp Retaining wall Skilled and Unskilled Laborers	67	53	43	43	43	48
21	Batching Plant Team A-02	13	13	18	14	10	15
22	Steel factory team A-02	0	0	0	11	16	21
23	Design & Geologist Management	7	6	6	5	5	5
24	Adit-02 Skilled and Unskilled Laborers	45	48	48	32	82	72
25	Adit-03 Skilled and Unskilled Laborers	15	30	30	50	50	65
26	Batching Plant Team A-03	0	0	0	0	17	22
27	Main Access Tunnel Powerhouse	0	0	17	27	22	22
28	Dam Site	0	0	0	0	0	16
29	Site Manager	1	1	1	1	1	1
30	Planning Engineer	3	3	3	3	3	3
31	Construction Manager	2	2	1	1	1	1
32	Admin Manager	1	1	2	2	2	2
33	Quantity Surveyor	1	1	1	1	1	1
34	Site Engineer	2	2	2	2	2	2
35	Site Engineer	3	3	3	3	3	3
36	Chief Surveyor	2	2	2	2	2	2
37	Land Surveyor	5	5	4	4	4	4
38	Assistant Surveyor	1	1	1	1	1	1
39	Material Engineer	1	1	1	1	1	1
40	Senior Engineer Technical	1	1	1	1	1	1
41	Structure Engineer	1	1	1	1	1	1
42	Senior Planning Engineer	3	3	3	3	3	3
43	Senior Accountant	1	1	1	1	1	1
44	Lab Technician	1	1	1	2	2	2
45	Electrical Engineer	1	1	1	1	1	1
46	Store Keepers	2	2	2	2	2	2
47	Quantity Surveyor	0	0	0	0	1	1
48	Mechanical Purchaser	0	0	0	0	1	1
49	Senior Engineer	0	0	0	0	1	1
50	Health Safety Inspector	1	1	1	1	1	1
51	HSE In charge	1	1	0	0	0	0
52	Geologist	2	3	3	3	3	3
53	Skilled Laborers	86	90	150	130	136	144
54	Unskilled Laborers	88	80	115	101	134	138
Total (No)		**493**	**516**	**637**	**665**	**786**	**868**
Out of Total, Local Employed Workforce (No)		**293**	**301**	**310**	**332**	**306**	**478**

Figure 2.8: Staff Deployment during the Reporting Period

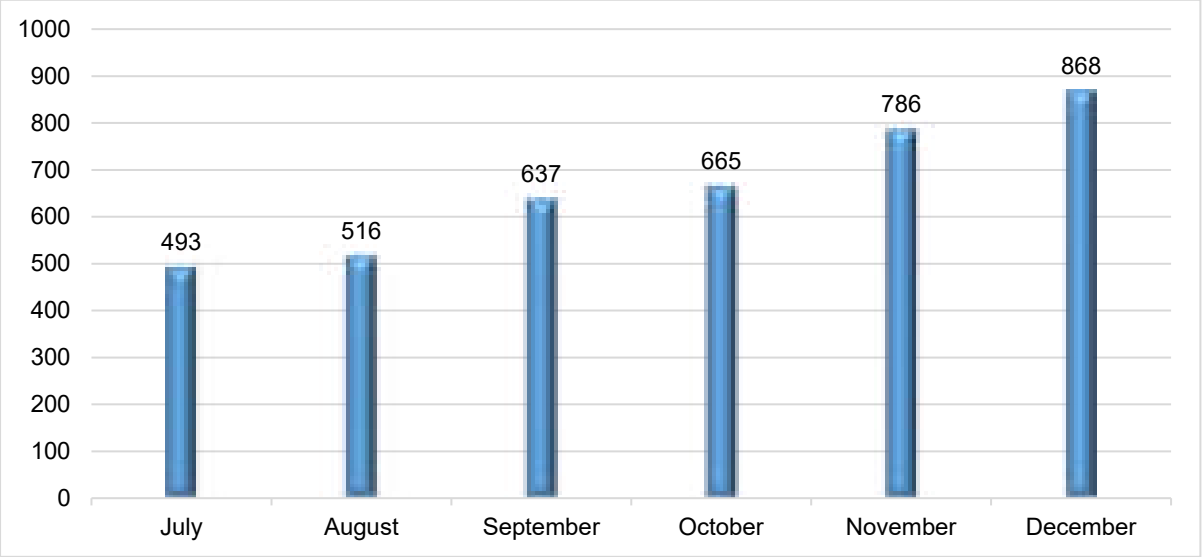
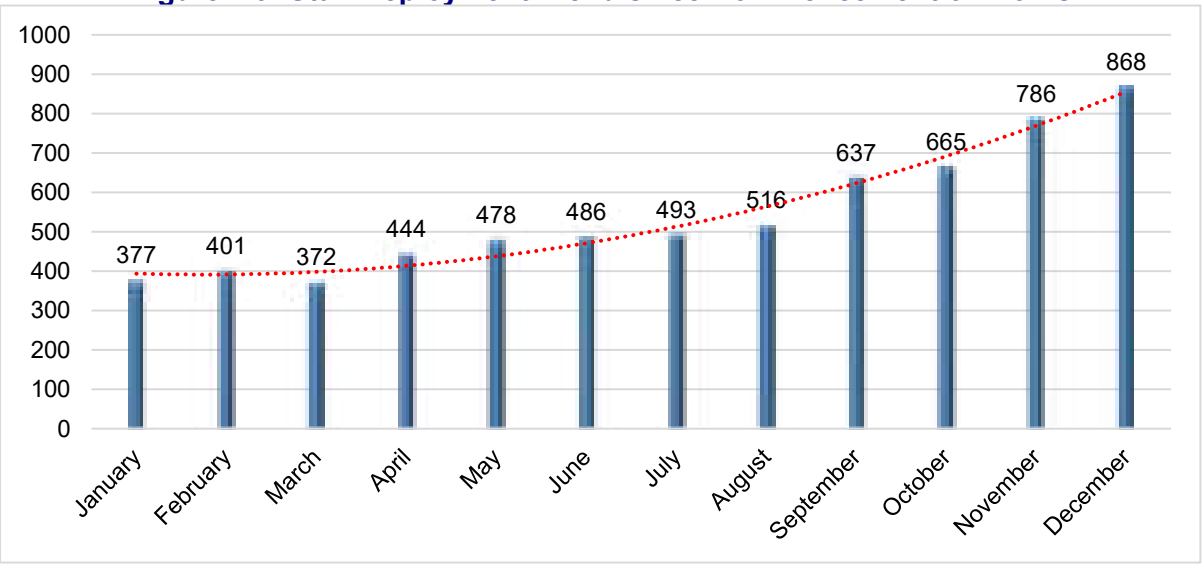


Figure 2.9: Staff Deployment Trend since Commencement of Works



43. As evident from the above figures, there is gradual increase in the EPC Contractor's workforce which shows increase in the existing construction activities and initiation of new activities at different sites.

44. Statistics of locals employed by the EPC Contractor during the reporting period and since commencing works are in **Figures 2.10 and 2.11** respectively.

45. As evident from the presentation, although there occurred a vivid increase in the EPC Contractor's overall workforce deployment, there was no such increase in local employment. In fact, the local employment percentages decreased in the last three months of the current reporting period, except for December where the percentage has shown some recovery. The EPC Contractor reported that as locals are mainly employed by subcontractors, the decrease in local employment is primarily attributed to the replacement of subcontractors during September, October and November of the reporting period which affected local employment. However, as stated, during the last month of the reporting period, there has been an increase in local employed persons.

Figure 2.10: Local People Employed during the Reporting Period

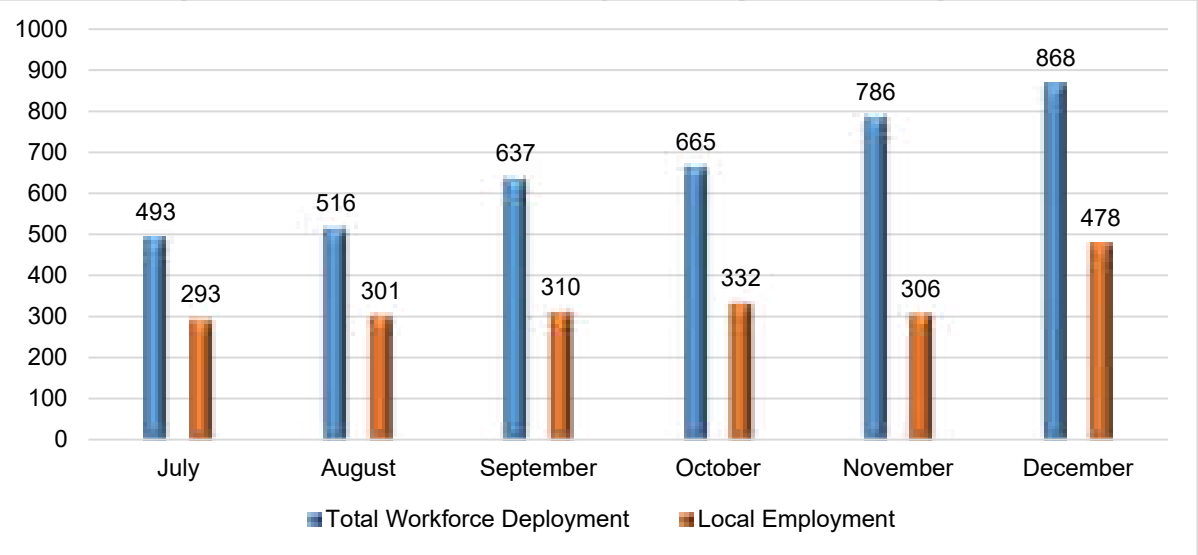
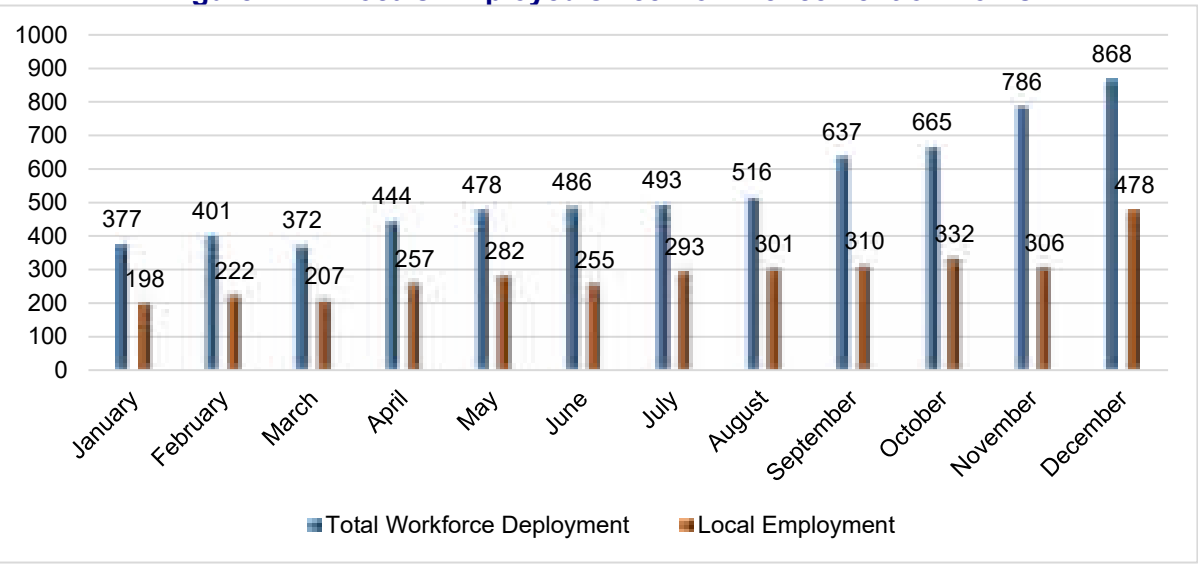


Figure 2.11: Locals Employed since Commencement of Works



46. **Table 2.12** exhibits the EPC Contractor machinery and important equipment deployed to the Site. The heavy machinery was mainly deployed for earthwork activities and transporting materials, including concrete to the construction sites.

Table 2.12: Machinery Deployed to Project during the Reporting Period

S/No	Machine	Model	Total No. Deployed	Deployment Month					
				Jul	Aug	Sep	Oct	Nov	Dec
1	Excavator	HITACHI 200	1	1	1	1	1	1	1
2	Excavator	Hyundai	1	1	1	1	1	1	1
3	Crawl Excavator	CDM 6225	1	1	1	1	1	1	1
4	Excavator	HITACHI 200	5	5	5	5	5	5	5
5	Excavator	Doosan 210,225	4	4	4	4	4	4	4
6	Excavator	CAT,HYUNDAI	4	4	4	4	4	4	4
7	Excavator	Volvo 145, Sunny	5	5	5	5	5	5	5
8	Crawl Excavator	HITACHI 200	4	4	4	4	4	4	4
9	Loader		2	2	2	2	2	2	2
10	Mini Dumper		2	2	2	2	2	2	2
11	Dump Truck	FAW 280	5	5	5	5	5	5	5
12	Roller		1	1	1	1	1	1	1
13	Generator	200, 200, 65 KV 15 KV, 250	6	6	6	6	6	6	6
14	Batching plant	0.5m3	1	1	1	1	1	1	1

S/No	Machine	Model	Total No. Deployed	Deployment Month					
				Jul	Aug	Sep	Oct	Nov	Dec
15	Double Cabin	Revo, Tiger 2002	2	2	2	2	2	2	2
16	Car	Toyota Corolla	1	1	1	1	1	1	1
17	Transit Mixer	Nissan, Hino	2	2	2	2	2	2	2
18	Compressor/12Bar		2	2	2	2	2	2	2
19	Jeep		2	2	2	2	2	2	2
20	Trolley Crane		1	1	1	1	1	1	1
21	Drilling Equipment		14	14	14	14	14	14	14
22	Shotcrete Pump		2	2	2	2	2	2	2
23	Ventilation Fan		1	1	1	1	1	1	1
24	Power Generator	375KVA	1	1	1	1	1	1	1
25	Air Compressor		1	1	1	1	1	1	1
26	Peter Engine	25HP	2	2	2	2	2	2	2
27	Bulldozer		2	2	2	2	2	2	2
28	Car	Toyota Fortuner	1	1	1	1	1	1	1
29	Excavator	Mobile Sunny/ SAY155UU	1	1	1	1	1	1	1
30	Skid Dumper		1	1	1	1	1	1	1
31	Water Bozer		1	1	1	1	1	1	1
32	Concrete Silo		1	1	1	1	1	1	1
33	Mobile Shotcrete Pump		1	1	1	1	1	1	1
34	Vigo Hilux		1	1	1	1	1	1	1
35	Dumper skid fiori		1	1	1	1	1	1	1
36	Power Generator 200 KVA		1	1	1	1	1	1	1
37	Dumper	Mini Hino	1	1	1	1	1	1	1
38	Generator	Cat	1	0	0	0	0	0	1
39	Air Compressor		1	0	0	0	0	0	1
40	Tractor		1	0	0	0	0	0	1
41	Jeep		1	0	0	0	0	0	1
42	Batching Plant	0.5 m3	1	0	0	0	0	0	1
43	Transit Mixer		1	0	1	1	1	1	1
44	Weighing Bridge		1	0	0	0	0	0	1
45	Dumper		1	0	0	0	0	0	1
46	Crawl Excavators	PC200-8	1	1	1	1	1	1	1
47	Dump Trucks	SCHMAN	7	7	7	7	7	7	7
48	Excavator	Hitachi 200, Hitachi 220	2	2	2	2	2	2	2
49	Excavator	CATN320D, Hyundai 210	2	2	2	2	2	2	2
50	Excavator	Komatsu 200, Komatsu 100	2	2	2	2	2	2	2
51	Loader	LW500	1	1	1	1	1	1	1
52	Crawler bulldozer	SD22	2	2	2	2	2	2	2
53	Side dump loader	WA380-6	1	1	1	1	1	1	1
54	Jeep		1	1	1	1	1	1	1
55	Loader	LW500FN, LW300FN	3	3	3	3	3	3	3
56	Diesel generators	V550C2, HDG22	2	2	2	2	2	2	2
57	Diesel generators	Perkins 121hp,1106A-70TG1	2	2	2	2	2	2	2
58	Water tank	SCS5160GSS	2	2	2	2	2	2	2
59	Concrete Mixture Machine		2	2	2	2	2	2	2
60	Diesel tank	Foton Daimler, M600	1	1	1	1	1	1	1
61	Water truck	DLQ5161GSSZ4	1	1	1	1	1	1	1
62	Flatbed truck	FG1JKPB	1	1	1	1	1	1	1
63	Concrete Mixture Machine		3	3	3	3	3	3	3
64	GPS-RTK Survey System Brand	Nan fang S82	4	4	4	4	4	4	4
65	Total station Brand	GPT-4002LN	1	1	1	1	1	1	1
66	Digital Levelling Instruments	Trimble DINI03	1	1	1	1	1	1	1
67	Pickup	4X4	4	4	4	4	4	4	4
68	Car	Prado	3	3	3	3	3	3	3
69	Car	MJ	1	1	1	1	1	1	1
70	Road Roller	XS183JPD	1	1	1	1	1	1	1

S/No	Machine	Model	Total No. Deployed	Deployment Month					
				Jul	Aug	Sep	Oct	Nov	Dec
71	Air Compressors		2	2	2	2	2	2	2
72	Crawler Drilling machine	T35	1	1	1	1	1	1	1
73	Diesel Air Compressor	XRHS666CD, XAHS750	2	2	2	2	2	2	2
74	Mobile truck crane 25 tons	QY25K5-I	1	1	1	1	1	1	1
75	Concrete Pump	HBT80.13.112RSD, HBT60.16.110SU	2	2	2	2	2	2	2
76	Power Transformer	500,800KV,100,1200KV &1250	5	5	5	5	5	5	5
77	Single Arm Rock Drilling Rig	D7	1	1	1	1	1	1	1
78	Binding Machine		1	1	1	1	1	1	1
79	Shaper	BC6063	1	1	1	1	1	1	1
80	jib crane	BZD-2	1	1	1	1	1	1	1
81	jib crane	BZD-2	1	1	1	1	1	1	1
82	Digital Underground Scale	SCS-60	1	1	1	1	1	1	1
83	low voltage switch box	380V 1600A	1	1	1	1	1	1	1
84	low voltage switch box	380V 2000A	1	1	1	1	1	1	1
85	low voltage switch box	UAN111-354-111	1	1	1	1	1	1	1
86	Ordinary lathe	C6160C	1	1	1	1	1	1	1
87	Vertical lifting table milling machine	ZX7045	1	1	1	1	1	1	1
88	Shaper	BC6063	1	1	1	1	1	1	1
89	sewage pump	TS200-125-365	1	1	1	1	1	1	1
90	oil storage tank	5170 Gallon 19500L	1	1	1	1	1	1	1
91	lathe	CY6166B-3000	1	1	1	1	1	1	1
92	Shaper	B6065	1	1	1	1	1	1	1
93	Vertical lifting table milling machine	XQ6232W-B	1	1	1	1	1	1	1
94	Radial drilling machine	Z5140A	1	1	1	1	1	1	1
95	Single column press	YX41-100T	1	1	1	1	1	1	1
96	Other hydraulic presses (pipe crimping machines)	XM91-C1	1	1	1	1	1	1	1
97	lathe		1	1	1	1	1	1	1
98	Dump truck	Volvo	1	1	1	1	1	1	1
99	Excavator	210,323&323	3	3	3	3	3	3	3
100	Car	Mazda	1	1	1	1	1	1	1
101	Pickup double cabin		1	1	1	1	1	1	1
102	Lifter		1	1	1	1	1	1	1
103	Batching Plant	1.0m3	1	1	1	1	1	1	1
104	Ventilation Fan		1	1	1	1	1	1	1
105	Electric Air Compressor	XAMS850E	1	-	1	1	1	1	1
106	Transit Mixer Machine	ZZ1257N3641W	4	-	1	4	4	4	4
107	Wheel Excavator	Doosan DX210W	1	-	1	1	1	1	1
108	Wet Spray Trolley	TSR 2010	1	-	1	1	1	1	1
109	Loader	LW300FN	1	-	1	1	1	1	1
110	Robotic Arm Wet spray Machine	Sika Alive 272	1	-	1	1	1	1	1
111	Screw Air Compressor	XAS 186	1	-	1	1	1	1	1
112	Large Axial Flow Fan	AVH140.90.4	1	-	1	1	1	1	1
113	Dynamo	V550C2	1	-	1	1	1	1	1
114	Dynamo	J110 kVA	1	-	-	1	1	1	1
115	Wet spray trolley	TSR2010	1	-	-	1	1	1	1
116	Loader (robot arm)	LW300FN	1	-	-	1	1	1	1
117	Robotic arm wet spray concrete pump	Sika aliva702+Aliva302.1	1	-	-	1	1	1	1
118	Robotic arm wet spray concrete pump	Sika aliva702+Aliva302.1	1	-	-	1	1	1	1
119	dump truck	SX3255DR384R	1	-	-	1	1	1	1

S/No	Machine	Model	Total No. Deployed	Deployment Month					
				Jul	Aug	Sep	Oct	Nov	Dec
120	dump truck	SX3255DR384R	1	-	-	1	1	1	1
121	Diesel generators	1106A-70TG1/UCI274F	1	-	-	1	1	1	1
122	Diesel generators	SDMO MODEL J110KVA	1	-	-	1	1	1	1
123	dynamo	CUPP640(S)	1	-	-	1	1	1	1
124	dynamo	CUPP640(S)	1	-	-	1	1	1	1
125	Electric air compressor	XAMS850E	1	-	-	1	1	1	1
126	screw compressor	XAS186	1	-	-	1	1	1	1
127	Electric air compressor	XAMS850E	1	-	-	1	1	1	1
128	Electric air compressor	XAMS850E	1	-	-	1	1	1	1
129	Electric air compressor	XAMS850E	1	-	-	1	1	1	1
130	Electric air compressor	XAMS850E	1	-	-	1	1	1	1
131	Axial Fan	2*AVH125.90.4.8	1	-	-	1	1	1	1
132	Three Arm Trolley	BOOMER XL3D	1	0	0	0	0	0	1
133	Geological Drilling Rig	Xy-2	1	0	0	0	0	0	1

2.4 Material Resource Utilization

47. During the reporting period, several major construction materials were utilized in constructing permanent works. These materials include reinforced steel, cement, sand, and coarse aggregates. All of these materials were sourced from approved suppliers to ensure their quality and compliance with Project standards. The EPC Contractor procured construction materials from the approved sources mentioned against each type of construction material.

i. Coarse aggregate: Black Dimond and Ghuman
ii. Fine aggregate: Lawrencepur, Maira and Thakot
iii. Cement: Askari and Fauji
iv. Reinforced steel: Fazal and Ittifaq

48. Water used for concrete production was supplied from the local water sources with the prior written permission from the owner(s) of the source/users.

49. **Tables 2.13 and 2.14** show month-wise and cumulative details of the materials used in the Project construction activities including those stored at the Site. During the current reporting period, due to increase in construction activities, there is a vivid increase in the quantum of POL and water usage.

Table 2.13: Month-wise and Cumulative Details of Construction Materials

S/No	Month	Steel (Ton)	Cement (Bag)	Sand (cft)	Aggregates (cft)
1	July	32	1120	4163	2349
2	August	40	2100	3339	2179
3	September	8	2196	18617	10594.4
4	October	20	3412	12604	5484
5	November	15	8955	35256	30608
6	December	209.97	28191	63319	47424
Total for Reporting Period (July-December 2023)		324.97	45974	137298	98638.4
Total for Previous Reporting Period (Jan-June 2023)		293	2056	17635.13	24429
Cumulative for the Project		617.97	48030	154933.13	123067.4

Table 2.14: Month-wise and Cumulative Details of POL and Water Used (in Liter)

S/No	Month	Diesel	Petrol	Water
1	July	55758	984	635700
2	August	69450	832	631800
3	September	100699	819.67	891800

S/No	Month	Diesel	Petrol	Water
4	October	66209	704.9	897750
5	November	113854	492.23	1021800
6	December	180063	750.19	1128400
Total for Reporting Period (July-December 2023)		586033	4582.99	5207250
Total for Previous Reporting Period (January-June 2023)		365025	2842.5	3047400
Cumulative for the Project since Commencement of Works		951058	7425.49	8254650

Construction Works at Adit Tunnel-01

Construction Works at Adit Tunnel-02

Construction Works at Adit Tunnel-03

Construction of Retaining Wall at R-04

Overview of R-03 and Connected Roads

Construction Works at Residential Colony

2.5 Description of Any Changes to the Project Design

50. There were no design changes in the reporting period. The Employer is yet to grant approval to the design changes reported in the previous SAEMR for January to June 2023 as the proposed changes are still under review by the independent panel of experts.

2.6 Description of Any Changes to the Agreed Construction Methods

51. Since approval of the basic engineering design on March 31, 2023, the EPC Contractor has been regularly submitting method statements for the PMC's review and approval. Although no changes have been proposed in the approved method statements so far, the approved changes will be reported in the corresponding SAEMR.

3 ENVIRONMENTAL SAFEGUARD ACTIVITIES

3.1 General Description of Environmental Safeguard Activities

52. During the reporting period, construction works at the Project residential colony, access roads, including access road at dam site, excavation at adit tunnels, and installation of batching plant at Adit-03 site remained in progress.

53. HSE aspects of the aforementioned activities were regularly monitored and supervised by the PMC and PIU staff. Also, during the reporting period, the PMC supervisory staff monitored quarterly instrumental environmental monitoring conducted by the KPEPAapproved laboratory at the pre-identified locations at Site.

54. During the reporting period, PMC and PIU relevant staff undertook site visits in connection with the due diligence survey of the muck disposal sites identified by the EPC Contractor, and offices identified by the Wildlife and Fisheries departments of the government of KP for executing activities envisaged under the Project-specific BAP in the area of management. Also, consultation meetings were held with the stakeholders of the Project specific and Basin-wide BAPs.

55. During The regular weekly and fortnightly HSE progress review meetings among PIU, PMC and EPC Contractor, HSE activities were prioritized, action plans were furnished, and targets were set for rectifying non-complied activities observed during the course of HSE supervision by the PMC/PIU supervisory staff. A copy of the minutes of meeting of one such meeting is attached as **Annexure-01**.

56. From September 13 to 14, 2023, the ADB safeguard progress review mission met with the PIU, PMC and EPC Contractor, and undertook Site visit whereby no major non-compliance was observed at the EPC Contractor's camp at works site(s). In connection with the mission proceedings, on September 18, 2023, the project HSE portfolio presentation was delivered to with particular emphasis on Project-specific BAP implementation, and consultation with the stakeholders of Basin-wide BAP. Also, on December 18, 2023, the PIU and PMC jointly delivered the HSE portfolio presentation to the ADB environmental safeguards handover mission in PEDO House Peshawar.

57. In addition to the regular Site visits of the Health and Safety Monitor of PMC, the EEM, ADB safeguards team, Deputy Director HSE and Gender of PIU, and EE of the PMC undertook site audits in various months of the reporting period.

58. Alongside other periodic HSE trainings, like trainings on induction and toolbox talks on August 8 and 9, 2023, the EPC Contractor organized a two-day annual OHS training imparted by Rescue 1122 of District Mansehra. To encourage the workforce in adapting to and implementing HSE provisions, the EPC Contractor held regular HSE champion programs whereby trophies and cash prizes were distributed among HSE Champions of the Month.

59. Following is a brief description of the major safeguard activities undertaken during the reporting period.

3.1.1 HSE Progress Review Meetings

60. As apprised in the preceding paras, to ensure consistent implementation of the HSE provisions at Site and at construction camp(s), and to resolve non-complied issues, regular tripartite meetings among PIU, PMC and EPC Contractor are being held since commencement of Works at Site. The agenda items for such meetings usually remained the same, i.e. item-wise review of HSE progress, review of targets set in the previous meeting(s), furnishing weekly workplan for non-resolved issues, and identifying impediments to implementing measures proposed in the EMP/SSEMP. Minutes of one such meeting are attached as **Annexure-01** to the report.

61. So far, these meetings have been effective in resolving HSE-related Site issues and pushing the EPC Contractor to swiftly resolve pending issues/non-compliances. These weekly/fortnightly meetings also enabled the supervisory staff to quickly fill the gaps identified, and decide on matters requiring PMC/PIU's decision.

HSE Weekly Progress Review Meeting on October 27, 2023

3.1.2 Due Diligence of Muck Disposal Sites and Batching Plant

62. During the reporting period, the EE of PMC undertook due diligence of sites identified by the EPC Contractor for disposal of muck material and batching plant.

63. **Muck disposal sites.** On September 25 and 26, 2023, the EE of PMC undertook due-diligence survey of the potential muck disposal sites. Findings of the due diligence survey were accordingly shared with the EPC Contractor for further necessary action as instructed by the PMC. Out of the ten (10) identified sites, only one site was found suitable subject to construction of protection and drainage works, while the rest were either found unfeasible or required costly access and huge protection works.

64. Synopsis of the PMC findings, the EPC Contractor's required actions thereto, and future submissions for review are attached as **Annexure-02**.

65. **Batching plant site.** Pursuant to the ADB Safeguard team's directions at the meeting held on September 14, 2023 at the EPC Contractor's A-02 Camp, the EE of PMC furnished the Batching Plant Due Diligence report, which was submitted to ADB on September 18, 2023 for review and concurrence. The report is primarily based on findings and recommendations of the plant due diligence surveys carried out in August and November 2022.

PMC EE's Visit to the Identified Muck Disposal Site at R-03 (September 25, 2023)

66. As shown on the Google image below, the proposed batching plant site is identified at the left bank of the Ganhool Nullah, around 200 m downstream of the main camp with elevation difference of around 10 m. The site was found suitable subject to construction of protection works along the Ganhool Nullah.

Site Identified for Batching Plant

3.1.3 Biodiversity Action Plan

67. In the EIA report, two types of Biodiversity Action Plans (BAPs) were identified, i.e. (i) Basin-wide BAP, and (ii) Project-specific BAP in the Area of Management. As such, BAP activities carried out during the reporting period are separately described as follows.

68. **Basin-wide BAP.** In continuation of consultation meetings with stakeholders in August and September 2022 and thereafter as agreed with the ADB safeguards team on September 18, 2023, the PIU arranged two virtual meetings on the agenda item, "*Biodiversity Action Plan (BAP) financing provisions in the EIA reports/tariff of hydropower projects in the Jhelum Basin and assessment of challenges in its materialization"*. The meeting on November 14, 2023 was participated by Basin-wide BAP prospective financiers, i.e. Karot, Mahal and Kohala HPPs, while the second meeting on November 17, 2023 was participated by representatives from Sukki Kinari and Azad Pattan HPPs. Minutes of both the meetings are attached as **Annexure-03**.

69. In both meetings, although some of the project developers explicitly excused of financial contributions in establishing the Institute for Research on River Ecology (IRRE) and Watershed Management Organization (WMO), it was generally agreed that PIU should call

larger consultation meetings involving the Private Power and Infrastructure Board (PPIB), hydropower developers and ADB to shape future course of action. Due to the immense challenges/constraint coupled with the absence of policy instrument, neither PEDO nor a single project developer has the capacity/legal authority to lead the initiative.

70. The proposed larger consultation meeting is tentatively scheduled in the third week of February 2024. Proceedings of the meeting will be recorded in the "Second Basin-wide BAP Consultation Report", which will be submitted to ADB for consent on the recommendations.

71. **Project-specific BAP.** Consequent upon ADB's concurrence to the proposed changes in the institutional arrangement and BAP Management Committee composition, PD Balakot HPP convened a meeting with the Fisheries and Wildlife departments of the Government of KP on August 3, 2023 at PEDO House Peshawar to finalize various modalities enabling PEDO to enter into the Project-specific BAP implementation agreement(s).

72. As result of the meeting, both departments notified their respective focal persons for further interactions with PIU and PMC on the matters pertaining to the Project-specific BAP.

73. From October 18 to 20, 2023, the EE of PMC, and Deputy Director EHS and Gender of PIU conducted a field visit with the officials of Wildlife and Fisheries departments in connection with the reconnaissance of field offices identified for the BAP implementation in the Area of Management. In this regard, the Wildlife office identified at Kanshai was visited. However, the facility was found unfeasible for BAP intervention as it is difficult to access and involves entirely new construction of the 2005 earthquake-damaged structure. Also, there is no electric power or water supply to the facility, and the facility was not functional. Alternatively, the SDFO (Wildlife) office in Balakot was also visited, and was found feasible subject to adding room(s). SDFO apprised that his office is already negotiating with the owner of the facility to construct two additional rooms which may be allocated for BAP interventions.

74. The Fisheries department identified a facility for BAP interventions, which was visited with the Deputy Director Fisheries Mansehra office, and found feasible as the facility is located on the N-15 road and adjacent to the operational hatchery of the department near Jared village.

Visit with Deputy Director Fisheries to the Facility Identified for BAP near Jared (October 19, 2023)

3.1.4 Establishment of Fish Hatchery

75. Under condition "hh" of the "Environmental Approval" to the EIA report, PEDO will finance construction/establishment of a Fish Hatchery for the provincial government to offset

impact on the fish resources of the Kunhar River. In compliance with the aforesaid condition, on December 6, 2023, PIU and PMC met with the Director General Fisheries Government of KP and his team. It was agreed that a follow up meeting with the PD will be held, while the site identified for establishing the hatchery will subsequently be visited, if accessible in the winter season, to assess its feasibility. Outcome of the proposed meeting and site findings will accordingly be reported in the upcoming SAEMR.

Meeting with Director General Fisheries in connection with Establishment of Fish Hatchery

3.1.5 Annual OHS Training

76. Pursuant to the EMP/SSEMP requirements, EPC Contractor arranged the Annual OHS) Training on August 8 and 9, 2023. The two-day training was imparted by professionals of the Rescue 1122 of District Mansehra. The training was participated by relevant staff from PIU, PMC, and the EPC Contractor's HSE staff and supervisors from the work sites, workshop and batching plant, etc.

77. On the first day of the training, the Rescue 1122 professionals presented various aspects of OHS, including risks at work site, emergency response, and methods for first aid administration. At the end of presentation, fire extinguishing drills and training on first aid administration were also held at the Adit-02 camp.

78. On the second day of the OHS training, field demonstrations were held at Adit-02, and the workshop and batching plant sites wherein drills were undertaken involving emergency response, evacuation, and first aid treatment in case of occurrence of incident(s).

79. At the end of the training, certificates were distributed among the participants. Below are photos of the Annual OHS Training.

Presentation on Day 1

First Aid Demonstration at Camp on Day 1

Emergency Response Demonstration at Site on Day 2

3.1.6 Meetings with ADB/AIIB Safeguards Team

80. **Meeting with safeguard progress review mission.** From September 13 to 18, 2023, the ADB safeguards team met with PIU, PMC and the EPC Contractor, and undertook Site visit. While Site visit details have been given under subhead “Site Audit”, proceedings of the meetings and presentation are synopsized hereafter.

81. On September 18, 2023, the EE of PMC presented progress on the Project HSE portfolio with particular emphasis on Project-specific BAP implementation and consultation with the stakeholders of Basin-wide BAP. Various challenges to implementing the Basin-wide BAP were briefly discussed. It was agreed that PIU will submit the findings of the upcoming stakeholder consultation meeting with their recommendations for future course of action for ADB’s consent. It was also agreed that various other submissions will be made as per schedule given in the aide memoire.

82. **Meeting with ADB safeguards handover mission.** On December 18, 2023, the PIU and PMC jointly delivered HSE portfolio presentation to ADB at PEDO House Peshawar. It was agreed that PIU will submit the following documents by January 15, 2024: (i) Tree Plantation Plan, (ii) Blasting Management Plan, and (iii) updated EIA report.

Meeting with the ADB Safeguard Progress Review Mission at Adit-02 Camp (September 14, 2023)

Presentation to the ADB Safeguard Handing-over Mission (December 18, 2023

3.1.7 Instrumental Environmental Monitoring

83. KPEPA certified laboratory, namely Integrated Environment Laboratory conducted quarterly instrumental environmental monitoring for air quality, noise level, water quality, and soil analysis at the locations pinned in the SSEMP where baseline instrumental monitoring was done in December 2022. The third quarter instrumental monitoring was conducted in September/October 2023, while the second quarter monitoring was conducted in December 2023.

84. Details of the instrumental environmental monitoring and results have been given under dedicated subhead while signed copies are attached as **Annexure-04.**

Air, Noise Monitoring and Drinking Water Sampling (Spring Water) at Adit-03 (Kholia) Q-3

3.2 Site Audit

85. **Table 3.1** exhibits the Site visits undertaken by the EEM, PIU, PMC, EPC Contractor's environmental staff and the ADB Safeguard mission as part of the Site audit. Since the PMC's Health and Safety Monitor visits the Site on almost daily basis, his routine inspection/supervision visits are not reflected herein.

86. During these visits, EHS aspects of the construction activities pertaining to permanent access roads, residential colony, camp facilities, batching plants, adit tunnels, and temporary access roads were audited.

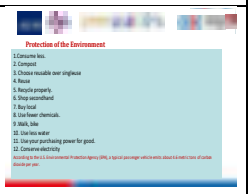
87. The EEM's observations recorded during his visit on July 18, 2023, and their rectifications are in **Table 3.2**, followed by the photos of the Site audits.

Table 3.1: Site Audit Conducted during the Reporting Period

Visit Date	Auditor		Purpose of Audit	Summary of Findings
	Title	Name		
July 18, 2023	**PIU:** Deputy Director HSE and Gender	Ibtesaam Zaima	HSE compliance audit of Site and identification of gaps in measures proposed in SSEMP/EMP	Although, detail observations have been given in separate table however, lack of exhaust facilities in Audit-02 tunnel, and gaps in solid and hazardous waste management were some of the main observations recorded by the EEM.
	PMC: i. Environmental Expert ii. Health and Safety Monitor	i. Assad Ali Khan ii. Fawad Ali Shah		
	EE M	ii. Dr.Abdul Qayyum		
	EPC Contractor: i. Environmental Manager ii. H & S Manager	i. Irshad Saeed ii. Qi Ziu Feng		
September 14, 2023	**ADB:** i. Principal Energy Specialist (East, Central and West Asia Team) ii. Environmental Specialist - Country Environment Focal Person	i. Adnan Tareen ii. Sayeed Asim Ali Sabzwari		No major non-compliance was observed, neither at Site nor at camp except minor housekeeping issues, and generator emission associated with exhaust pipe.
	PIU: i. Project Director **ii.** Deputy Director HSE and Gender	i. Aziz Raza ii. Ibtesam Zaima		
	PMC: El E, H&S Monitor, DTL and Chief Engineer (D&SW)	i. Assad Ali Khan ii. Syed Ali Fawad Shah iii. Muhammad Hussain iv. Ishtiaq Hussain	HSE compliance audit of construction works at Site	
	EPC Contractor: iii. Environmental Manager i. H&S Manager	iii. Irshad Saeed i. Qi Ziu Feng		
September 25 & 26, 2023	**PMC:** EE	Asad Ali Khan	Site Audit of HSE activities and due-diligence survey of the sites identified for muck disposal	i. Non-availability of requisite medical staff and ambulance. ii. No latrine facilities at some sites iii. Improper storage of workshop materials iv. Out of the ten (10) identified sites, only one site was found suitable subject to construction of protection and drainage works while rest were either found unfeasible or required costly access and huge protection works
	EPC Contractor: i. Environmental Manager ii. Planning Officer	i. Irshad Saeed ii. Awais Khan		
	PIU: Patwari	Waqar Ahmad		
	EPC Contractor: Manager GRC	Muhammad Arif		

Table 3.2: EEM's Observations and their Rectification/Accomplishment Status

S/ No	EEM Observation	Action Taken	Previous Picture	Status	Current Picture
1	Under the assembly point construction material was placed.	Construction material was removed from the assembly point.		Rectified	
2	Solid waste scattered around the fuel tank.	Solid waste removed, and fuel tank shifted to the site.		Rectified	
3	Engine oil drum placed on the ground without the secondary containment or dip tray.	Engine oil drum shifted to the storage area with secondary containment.		Rectified	
4	Opposite to the fuel tanks, staining on the soil was prominent and contaminated the soil.	Staining removed, and contaminated soil discarded in the hazardous waste.		Rectified	
5	Fuel storage not marked and without concrete.	Fuel storage tank removed from the area.		Rectified	
6	Mobile oil stored in container with the cotton waste (flammables).	Cotton rugs and waste removed from the container. Container shifted to the site and used for storing the cement bags.		Rectified	
7	Solid waste management system did not exist at site.	Solid waste management improved, while collection and disposal contract granted to the KDA.		Rectified	
8	Wood used in the kitchen for cooking.	Wood replaced by LPG in the kitchen for cooking purpose.		Rectified	

S/ No	EEM Observation	Action Taken	Previous Picture	Status	Current Picture
9	Three different color-coded waste bins not used to segregate solid waste.	Three different color-coded waste bins provided.		Rectified	
10	Prepare video of the Site orientation.	Site orientation video prepared.		Task accomplished	
11	Environmental awareness slide should add in the site safety induction.	Slide on environmental awareness added to the site safety induction		Task accomplished	
12	Suggestion box or stop card should be introduced at Site.	Suggestion box installed.		Task accomplished	
13	Provide copies of NOCs for waste disposal.	KDA issued NOC for waste disposal (copy attached as **Annexure-05**), while PIU will assist the EPC Contractor in pursuing the application for NOC. NOC is expected to be obtained by		Task partially accomplished	
14	Provide small waste bins in all rooms.	Small waste bins provided in the rooms.		Task accomplished	
15	Shift dispensary to the accessible place for all	Dispensary shifted to accessible place.		Task accomplished	
16	Ensure ventilation, cooling, fridge, chairs and tables in the mess.	The mentioned facilities were provided in the mess hall.		Rectified	
17	Septic tank should have proper vent and there shall be no containers over it	Septic tank area cleared from the containers and marked.		Rectified	

S/ No	EEM Observation	Action Taken	Previous Picture	Status	Current Picture
18	No hard barricade along the Ganhool Nulllah.	Hard barriers constructed.		Rectified	
19	Enclosed generator from three sides.	Generator enclosed from three sides.		Rectified	
20	Check the rain water flow in the batching plant area.	Drainage provided at the Batching Plant area		Rectified	
21	Remove spoil from the Nullah near batching plant.	Spoil removed from the Nallah.		Rectified	
22	Provide proper ventilation and lighting in the Adit-02 tunnel	Ventilation and lighting provided.		Rectified	
23	Conduct gas test in the tunnel for LEL and other emissions.	Gas test conducted by third party under quarterly instrumental		Task completed	
24	Kitchen effluent should treat before dump in the Nullah.	No action taken yet.		Not rectified	Rectification will be ensured till February 15, 2024

EEM's Visit to Adit-02 Tunnel Site.

ADB Safeguards Progress Review Mission Site Visit to R-03 (September 14, 2023)

EE's Visit to the Identified Muck Disposal Site at R-03 (September 25, 2023)

3.3 Issues Tracking Based on Non-conformance Notices

88. As reported in the previous SAEMR for January to June 2023, out of 47 minor non-compliances, 8 remained open at the end of the reporting period. However, during the current reporting period, among those 8 open issues, 7 were rectified, while the one pertaining to the discharge of kitchen effluent into the Ganhool Nullah remained unresolved which was accordingly included in the issues identified during the current reporting period. As per the EPC Contractor's commitment made in the weekly meeting, this issue will be resolved till February 15, 2024.

89. The minor non-compliances recorded during the current reporting period include delayed replacement of damaged personal protective equipment (PPE); issues in warehouse maintenance, and improper stacking of material in the shelves; improper storage and handling of the gas cylinders; performing different activities without barrier and signage; blockage of corridors; garbage burning at site by workers; issues in tunnel drainage system; unavailability of MSDS at chemical storage area; generation of dust due to the vehicles movement on unpaved access roads and dry shotcrete; cooking in the living room by the security staff; intermittent availability of banksman; delays in replacoffing the fire extinguisher, and the EPC Contractor's rectification of HSE issues.

90. The status of non-compliances is in **Table 3.3**.

Table 3.3: Tracking of Non-Compliances for the Current and Previous Reporting Periods

Issue	Reporting Period	
	January-June 2023	July-December 2023
Number of open issues	8	5
Number of closed issues	39	58
Total number of non-compliances	47	63
Percentage of issues closed	83%	92%

91. Table 3.3 shows that out of 63 minor non-compliances observed, 58 (92%) were resolved till end of the reporting period, while rectification of the remaining non-compliances is in progress. The issues under observation for rectification or where improvement is needed include arrangement for safe disposal of kitchen effluent, provision of gas test meter at the site, full-time deployment of the PMDC-registered doctor at the camp dispensary, provision of technical craft-wise trainings of the workers, and improvement in inspection regime.

92. It is also evident that the number of non-compliances recorded during the current reporting period was more than the previous reporting period. This increase is primarily attributed to the initiation of construction activities at the new sites and deployment of newly hired labors. It is expected that with the increased training frequency and toolbox talks, the level of non-compliances events involving the EPC Contractor's workforce will significantly be reduced.

3.4 Trends

93. There was upward trend in the number of non-compliances recorded from the previous to the current reporting periods. However, the EPC Contractor's capability to resolve the issues has been enhanced which is construed as a positive trend.

3.5 Unanticipated Environmental Impacts or Risks

94. No unanticipated environmental impacts or risks were observed during the reporting period.

4 STATUS OF COMPLIANCE WITH COVENANTS

95. **Table 4.1** exhibits the compliance status of the environmental safeguards-related covenants in the Project Agreement signed on May 21, 2021 between ADB, and KP Province and PEDO.

Table 4.1: Compliance Status with Environmental Covenants[3]

Covenant	Reference in Project Agreement	Compliance Status
Procurement. PEDO shall not, award any Works contracts which involves environmental impacts until: (a) Khyber Pakhtunkhwa Environmental Protection Agency (KPEPA)_has granted the final approval of the EIA; and (b) the Borrower has, or has ensured that PEDO has, incorporated the relevant provisions from the EMP and BAP into the Works contract.	Para. 3, page 8	**Complied** (a) KPEPA granted "Environmental Approval" to the project EIA report on July 6, 2021. (b) The EHS safeguards-related provisions have mainly been incorporated in (i) Volume-01 of 07 (Appendix-9), and (ii) Volume-03 of 07 (GCC and SCC) of the EPC Contract.
Environment. Khyber Pakhtunkhwa and PEDO shall ensure that the preparation, design, construction, implementation, operation and decommissioning of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Borrower and Khyber Pakhtunkhwa relating to environment, health and safety; (b) the Environmental Safeguards; and (c) all measures and requirements set forth in the EIA, the EMP, the BAP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	Para. 5, page 9	**Compliance in progress** (a) KPKEPA granted "Environmental Approval" to the project EIA report on July 6, 2021. Requisite NOCs, from Forest, Fisheries, Wildlife and Mining & Mineral departments of the government of KP were obtained. (b) SSEMP, based on the EMP, Site data and the project requirement, was approved by the Employer on December 30, 2022. (c) EIA report has been updated to reflect changes in the Project-specific BAP implementation arrangements and composition of BAP Management Committee. On August 11, 2023, the updated EIA report was submitted to the PIU for their review and onward transmission to ADB. Furthermore, consultation on Basin-wide BAP, and various activities under Project specific BAP remained in progress during the reporting period.
Human and Financial Resources to Implement Safeguards Requirements Khyber Pakhtunkhwa and PEDO shall make available necessary budgetary and human resources to fully implement the EMP, the BAP and the RP.	Para. 9 page 10	**Complied.** The requisite human and financial resources are available with the PIU, PMC and EPC Contractor. For BAP implementation, budgetary provision exists in the Project PC-1, whereas for the EMP implementation, the EPC Contractor has allocated a lump sum amount in his bid which is also reflected in the EPC Contract.
Safeguards – Related Provisions in Bidding Documents and Works Contracts. PEDO shall ensure that all bidding documents and contracts for Works contain provisions that require contractors to:	Para. 10, page 10	**Compliance in progress** The EHS safeguards-related provisions have mainly been incorporated in (i) Volume-01 of 07 (Appendix-9), and (ii) Volume-03 of 07 (GCC and SCC) of the EPC Contract.

[3] Project Agreement for Loan 4057-Pak: Balakot Hydropower Development Project (https://www.adb.org/sites/default/files/project-documents/49055/49055-007-pra-en.pdf)

Covenant	Reference in Project Agreement	Compliance Status
(a) comply with the measures relevant to the contractor set forth in the EIA, the EMP, the BAP and the RP (to the extent they concern impacts on affected people during construction), and any corrective or preventative actions set forth in a Safeguards Monitoring Report; (b) make available a budget for all such environmental and social measures; (c) provide the Borrower, Khyber Pakhtunkhwa and PEDO with a written notice of any unanticipated environmental, resettlement or indigenous peoples risks or impacts that arise during construction, implementation or operation of the Project that were not considered in the EIA, the BAP, EMP and the RP; (d) adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction; and (e) reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction.		(a) Implementation of SSEMP provisions is in progress at Site for the protection of EHS of the construction crew, community etc. (b) Budgetary provision exists in the EPC Contract for implementation of HSE related mitigation/preventive measures proposed in the SSEMP, EMP, BAP, or those which may be identified in Safeguards Monitoring Reports. (c) So far, no unanticipated risk(s) have been identified, but nevertheless provisions of the covenant, SSEMP, and conditions of contract will strictly be followed if any unforeseen risk is identified. (d) Construction activities were mostly undertaken within the permanent acquired land. Pursuant the EPC Contract provisions, any damage to the private/public property or utilities due to the EPC Contractor's Works will be reinstated/compensated at the EPC Contractor's cost. Nevertheless, the covenant will be taken care of before initiating permanent works at Site. (e) The temporary land acquired by the EPC Contractor for his facilities will be reinstated under the conditions of temporary lease contract(s), and in full compliance with the requirements of the EPC Contract. In this regard, copies of the lease agreements have been made part of the SSEMP.
Safeguards Monitoring and Reporting PEDO shall: (a) submit semi-annual Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission; (b) if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the EIA, the EMP, the BAP and the RP, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan; (c) no later than the commencement of works by the Works contractor, engage qualified and experienced external experts under a selection process and terms of reference acceptable to ADB, to verify information produced through the Project monitoring process, and facilitate the carrying out of any verification activities by such external experts; (d) no later than the commencement of works by the Works contractor, engage	Para. 11, pages 10 and 11	**Compliance in progress.** (a) This is the fifth SAEMR furnished in compliance with the mentioned loan covenant. Previous four reports were disclosed on the ADB website. (b) Till reporting period, no unanticipated environmental risks identified. (c) EEM is onboard since September 2022 whose external environmental monitoring report was approved and disclosed by the ADB. (d) External experts specified in the PAM are onboard in compliance with the covenant provisions. (e) No breach to compliance has occurred so far.

Covenant	Reference in Project Agreement	Compliance Status
external experts to monitor and report upon Project implementation, and facilitate the carrying out of any monitoring activities by such external experts; and (e) report any actual or potential breach of compliance with the measures and requirements set forth in the EMP, the BAP or the RP promptly after becoming aware of the breach.		
Prohibited List of Investments Khyber Pakhtunkhwa and PEDO to ensure, that no proceeds of the Loan are used to finance any activity included in the list of prohibited investment activities provided in Appendix 5 of the Safeguard Policy Statement.	Para. 12, page 11	**Complied.** Loan proceeds are solely being used for developing the Balakot HPP (300 MW).
Grievance Redress Mechanism Khyber Pakhtunkhwa and PEDO shall ensure that a joint safeguards grievance redress mechanism acceptable to ADB is established and functional in accordance with the provisions of the EIA, the EMP, the BAP and the RP no later than the date of award of the Works contract to consider safeguards complaints. The safeguards grievance redress mechanism referred to in paragraph 13 above will function to: (a) review and document eligible complaints of project stakeholders; (b) proactively address grievances; (c) provide the complainants with notice of the chosen mechanism and/or action; and (d) prepare and make available to ADB upon request periodic reports to summarize (i) the number of complaints received and resolved, (ii) chosen actions, and (iii) final outcomes of the grievances.	Paras. 13 and 14, page 11	**Complied** PEDO has notified the Grievance Redress Mechanism (GRM) contained in the approved EIA for the Balakot HPP (300 MW), which is operational since September 2022. The EPC Contractor's internal GRM has also been notified and is operational since Commencement of Works. The notified GRM is effectively performing the intended functions.
Labor Standards, Health and Safety Khyber Pakhtunkhwa and PEDO shall ensure that the core labor standards and the Borrower's applicable laws and regulations are complied with during Project implementation. Khyber Pakhtunkhwa and PEDO shall include specific provisions in the bidding documents and contracts financed by ADB under the Project requiring that the contractors, among other things: (a) comply with the Borrower's applicable labor law and regulations and incorporate applicable workplace occupational safety norms; (b) do not use child labor; (c) do not discriminate workers in respect of employment and occupation; (d) do not use forced labor;	Para. 15, page 11	**Compliance in progress.** Provisions from Law of the land dealing with labor have appropriately been made part of the EIA report and EPC Contract.

Covenant	Reference in Project Agreement	Compliance Status
(e) allow freedom of association and effectively recognize the right to collective bargaining; and (f) disseminate, or engage appropriate service providers to disseminate, information on the risks of sexually transmitted diseases, including HIV/AIDS, to the employees of contractors engaged under the Project and to members of the local communities surrounding the Project area, particularly women.		

5 RESULTS OF ENVIRONMENTAL MONITORING

5.1 Overview of Monitoring Conducted during the Current Period

96. The prime objectives of environmental monitoring are to:

i monitor project impacts on physical, biological and socio-economic indicators, and assess adequacy of the EMP/SSEMP in identifying and mitigating the project adverse impacts;
ii recommend mitigation measures for any unforeseen impact, or where the impact level exceeds from those anticipated in EMP/SSEMP; and
iii ensure legal compliance including safety of workforce and community.

97. During the project execution, two types of monitoring activities were undertaken.

i **Compliance Monitoring:** To ensure that mitigation/preventive measures proposed in EMP/SSEMP are adhered to; and
ii **Effect Monitoring:** To monitor the effect of construction activities on various components of the environment such as air, water, noise and soil etc.

98. Compliance to the specifications and implementation of the mitigation measures proposed in EMP/SSEMP were regularly supervised by the PMC while effect monitoring, covering monitoring of air pollution, noise level, water and soil analysis, were undertaken by the EPC Contractor through hiring of third-party services. It shall be noted that PMC not only supervises field activities of the third-party laboratory, but also regularly reviews their instrumental environmental monitoring reports.

99. The instrumental environmental monitoring carried out during the reporting period is detailed in the succeeding paras.

5.2 Instrumental Environmental Monitoring

100. As highlighted under sub-head 3.1.7, quarterly instrumental environmental monitoring under the Balakot HPP (300 MW) was carried out by KPEPA-certified laboratory, namely Integrated Environment Laboratory at the locations pinned in the SSEMP. The third quarter monitoring was conducted in October 2023, while the fourth quarter monitoring was undertaken in December 2023.

101. The instrumental environmental monitoring points, and the monitoring plan are in **Figure 5.1** and **Table 5.1** respectively.

Figure 5.1: Instrumental Monitoring Points

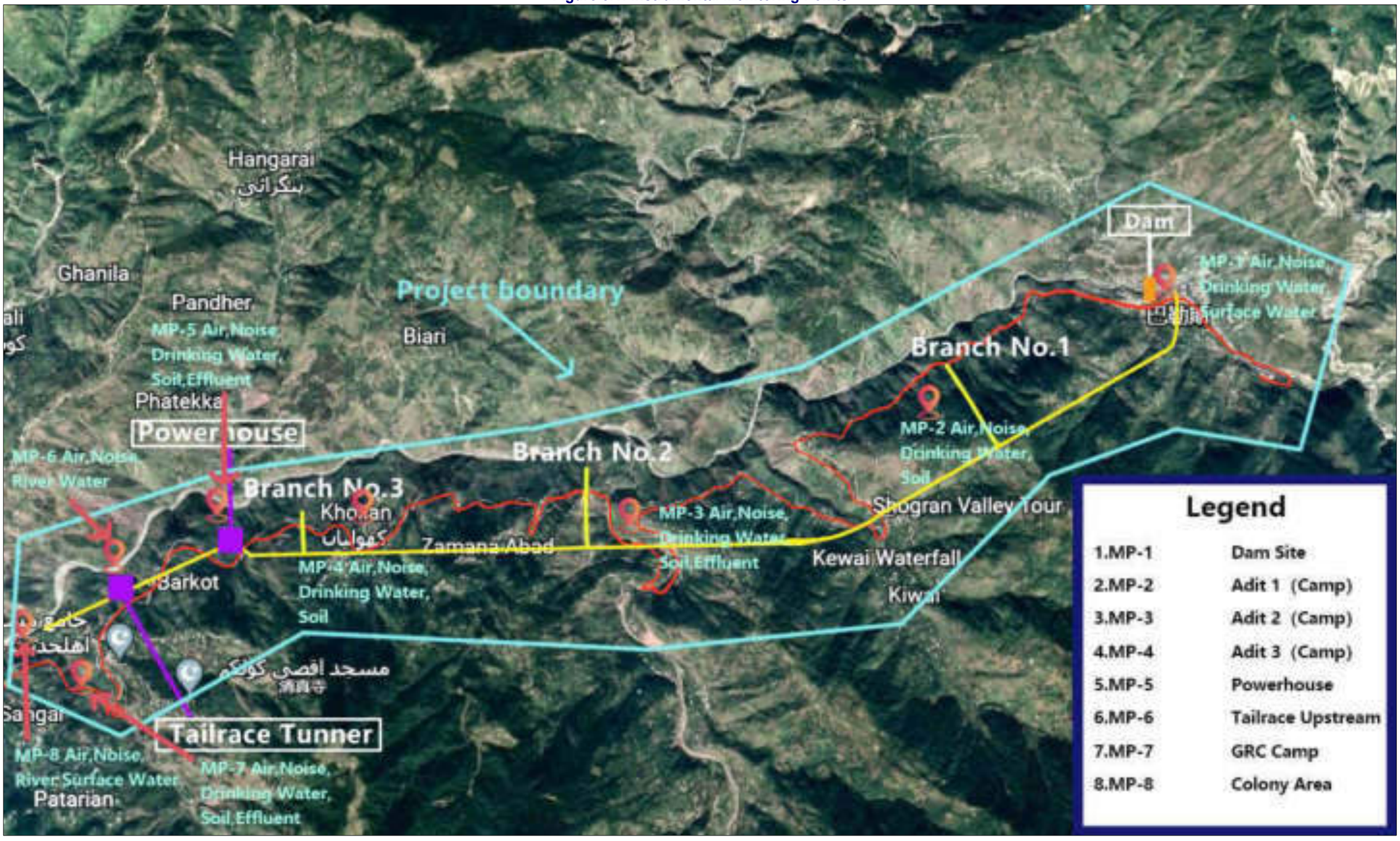


Table 5.1: Instrumental Environmental Monitoring Plan

Environmental Quality	Parameters	Standards/ Guidelines	Location	Monitoring Period/Frequency/ Sampling No/Year	Responsibility	
					Implementation	Monitoring
Pre-Construction Phase						
Air quality, noise level, water quality (drinking, and surface water of the Kunhar River), soil and effluent	Same as given for construction phase	Same as given for construction phase	Same as shown on map	Once	EPC Contractor	PIU and PMC
Construction Phase						
Air quality	SO_2, NOx, CO, O_3, SPM, PM_{10}, $PM_{2.5}$, humidity, wind direction, wind speed, temperature etc.	Air quality standards by NEQS, WHO	Same as shown on map	Quarterly (24-hour Duration)	EPC Contractor	PIU and PMC
Dust	Dust control	Air quality standards by NEQS, WHO		Quarterly (24-hour duration)	EPC Contractor	PIU and PMC
Noise level	dB(A)	Noise pollution control NEQS, WHO		Quarterly (24-hour duration)	EPC Contractor	PIU and PMC
Water quality	Surface water, temperature, turbidity, pH, TDS, EC, TSS, DO, COD, BOD_5	Water quality standards by NEQS, WHO		Quarterly	EPC Contractor	PIU and PMC
	Ground water: color, odor, taste, temperature, turbidity, pH, TDS, EC, TSS, $CaCO_3$, Hardness, potassium, nitrate, nitrite (as NO_2), phosphate, arsenic, COD, DO, TSS, total *coil form*, *faecal coliform* and *e. coli*	Water quality standard by NEQS, WHO		Quarterly	EPC Contractor	PIU and PMC
Soil pollution	Soil texture, pH, EC, available phosphorus and SAR.	NEQS, Government of Pakistan		Twice a year	EPC Contractor	PIU and PMC

102. Comparison of the two quarters of instrumental environmental monitoring results with the baseline results, and NEQS, World Health Organization (WHO), International Finance Corporation, and United States Environmental Protection Agencystandard values (where applicable) are briefly given hereunder. The signed copies of the results are in **Annexure-04**.

5.3 Monitoring of Air, Noise, Water and Soil analysis

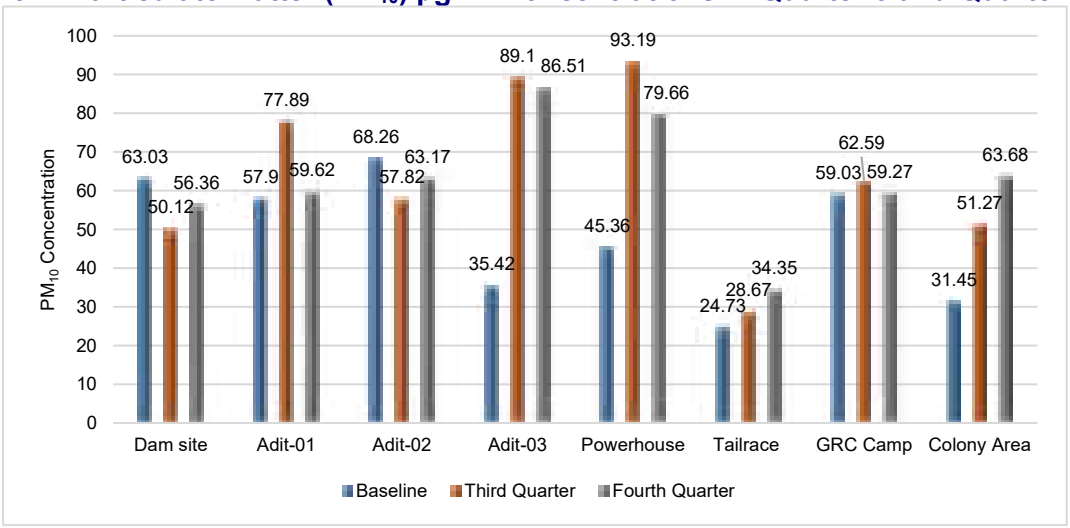
5.3.1 Ambient Air Monitoring

a. Particulate Matter Monitoring

103. **Methodology and instrument used.** Ambient particulate matter (PM) monitoring was carried out for assessing PM_{10} and $PM_{2.5}$ concentrations at the pre-identified locations within the Project reach. The Air Quality Monitoring System (AQMS-65) employed for PM_{10} and $PM_{2.5}$ is a fully integrated air monitoring station that delivers 'near reference levels' of performance parameters. With a size of a large suitcase, it can measure up to 20 different gases, particulate pollutants, and environmental parameters simultaneously. The AQMS-65 offers optimal balance between performance and measuring criteria pollutants.

104. **Comparison of results.** Ambient PM_{10} and $PM_{2.5}$ were monitored for 24 hours at the pre-identified locations as given in **Figure 5.1**. **Figure 5.2** exhibits the intended comparison as expounded in **Figure 5.1**.

Figure 5.2: Particulate Matter (PM_{10}) µg/m^3 Concentrations in Quarter 3 and Quarter 4 2023

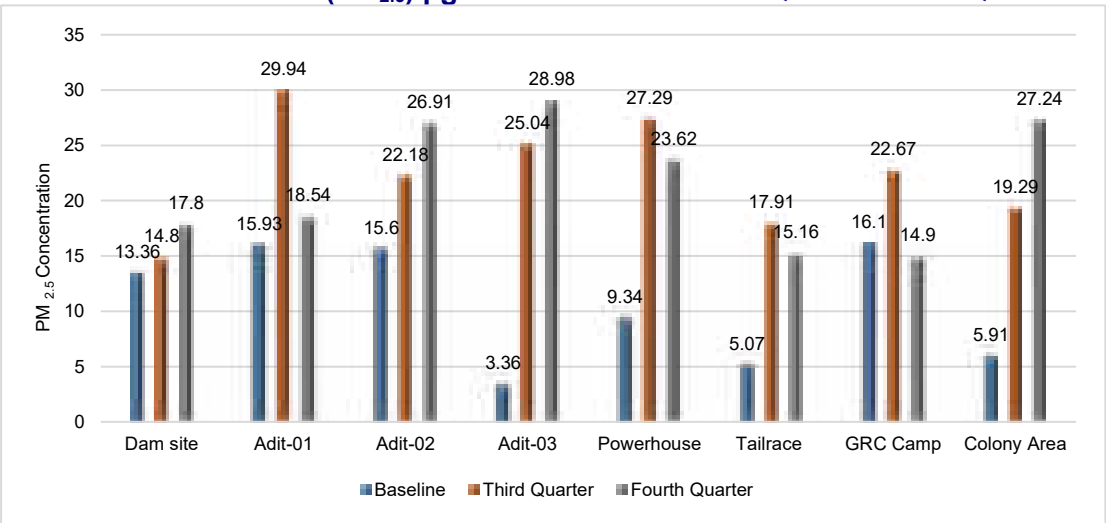


NEQS: 150 µg/m^3, WHO: 45 µg/m^3

105. As evident from the results above, the PM_{10} concentration at most of the sampling points exceeded the WHO guideline values but fell below the NEQS. In fact, during the reporting period, earthwork activities at Adit-01, Powerhouse and Adit-03 caused upward trend in the PM_{10} concentration. Although the increase was primarily attributed to the shotcreting activities at those sites which are essential for slope stabilization, frequent vehicular movement on the unpaved access roads also contributed to this increase. As a mitigation measure, sprinkling frequency on the unpaved roads was increased, while concentration of construction vehicles was minimized during the shotcreting operation.

106. The results obtained for $PM_{2.5}$ shows compliance with the NEQS but exceeds the WHO guideline values at some locations. As evident from **Figure 2.3**, even baseline results recorded at some locations exceeded the WHO guideline values.

Figure 5.3: Particulate Matter ($PM_{2.5}$) µg/m³ Concentrations in Quarter 3 and Quarter 4 2023



NEQS: 35 µg/m³, WHO: 15 µg/m³

107. As expounded under PM_{10} concentration, due to excavation for access roads, land leveling at colony site, and earthwork activities at adit tunnels, the result obtained shows increase in the $PM_{2.5}$ concentration. Although sprinkling of water was regularly being undertaken at these sites, no special mitigation measures other than those specified in the SSEMP were adopted as the concentration was for a short period and below the permissible NEQS guiding values.

108. **Figures 5.4 and 5.5** show the overall trend of the PM concentration recorded at the monitored sites during the 2023. during this period, the EPC Contractor mainly undertook earthwork activities involving cutting for roads, and land leveling at colony and adit tunnels sites, upward trends in the PM_{10} and $PM_{2.5}$ concentrations were recorded at sites where construction activities either started or remained in progress.

b. Gas Monitoring

109. **Methodology and instrument used.** The ambient gas monitoring was carried out assessing carbon monoxide (CO), sulphur dioxide (SO_2) and nitrogen oxide (NO_x) at the pre-determined locations. AQMS-65 was also employed for monitoring.

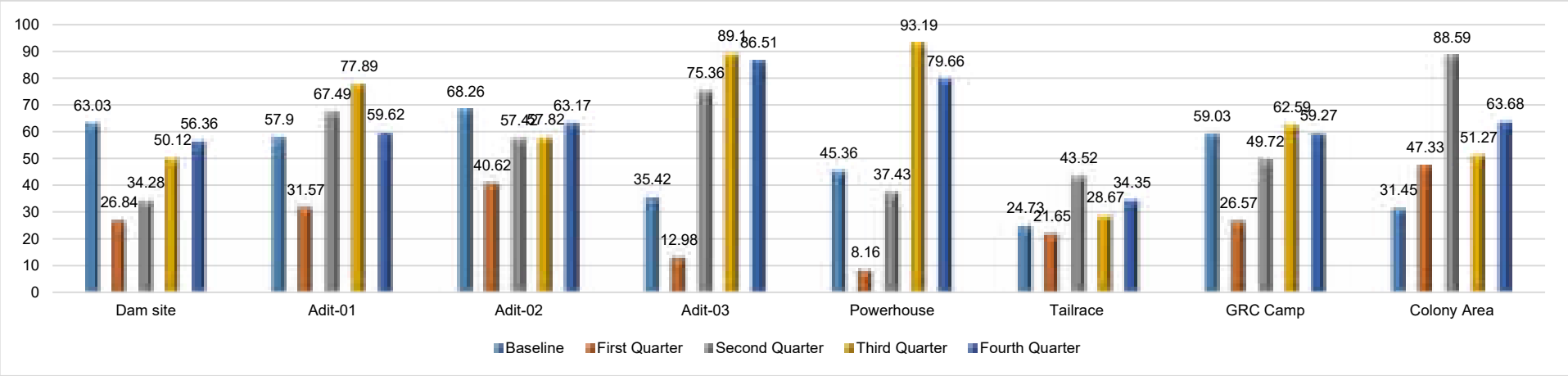
110. **Comparison of results.** The 24-hour ambient gas monitoring for the foregoing gases was carried out during the third and fourth quarters of 2023 at the pre-identified locations in the Project area. Comparison of the results obtained is in **Figure 5.6**.

111. The results recorded in both quarters show increase in the CO concentration. The sharp increase compared to the baseline recorded results at adit tunnels and powerhouse sites was due to the concentration of construction machinery and vehicles at these sites as construction activities remained in full swing during the monitoring period. However, the results recorded at the tailrace show consistency because during both quarters there were no activities at the monitoring site. Overall, the recorded results fall well below the NEQS and WHO guideline values.

112. As shown in **Figure 5.7**, the NO_x concentration was well below the NEQS and WHO permissible limits. Again, the high concentration was due to the increase in vehicular movement at active construction sites.

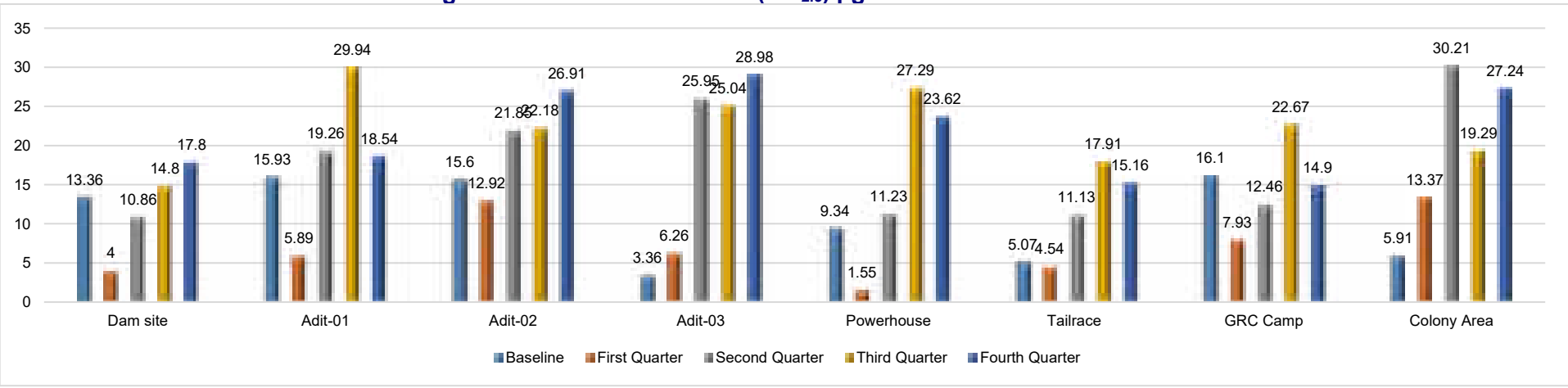
113. As shown in **Figure 5.8**, the NO_2 concentration in all the quarters fell below the guideline values of NEQS and WHO. The sharp increase at Adit-03 and Powerhouse sites was again due to heavy machinery concentration at these sites.

Figure 5.4: Particulate Matter (PM_{10}) µg/m^3 Concentrations in2023



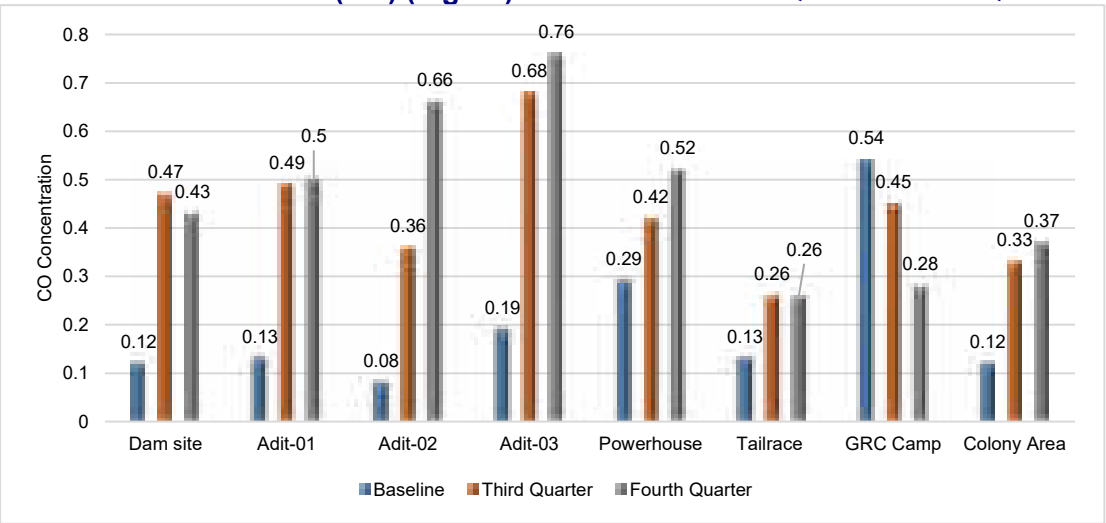
NEQS: 150 µg/m^3, WHO: 45 µg/m^3

Figure 5.5: Particulate Matter ($PM_{2.5}$) µg/m^3 Concentrations in2023



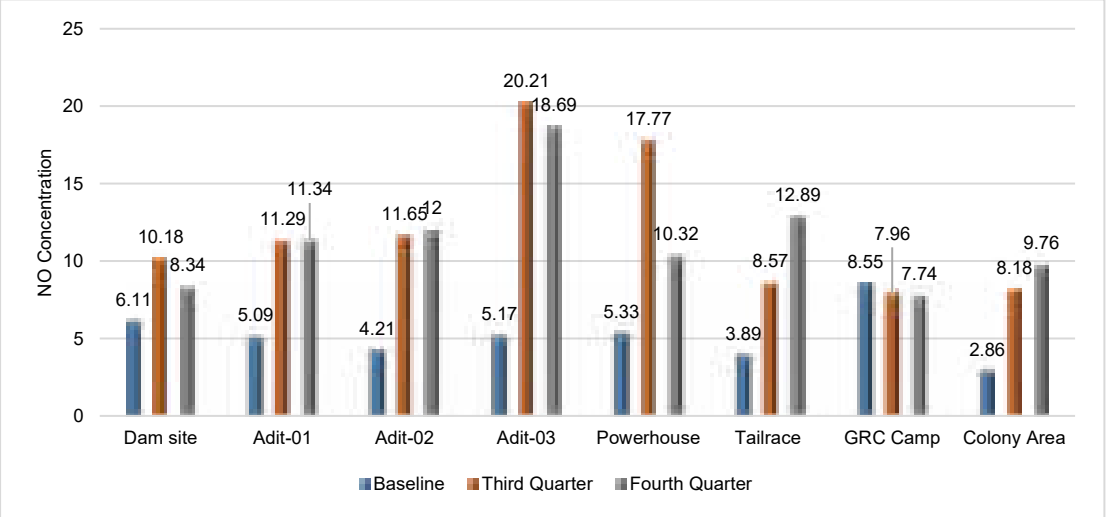
NEQS: 35 µg/m^3, WHO: 15 µg/m^3

Figure 5.6: Carbon Monoxide (CO) (mg/m^3) Concentrations in Quarter 3 and Quarter 4 2023



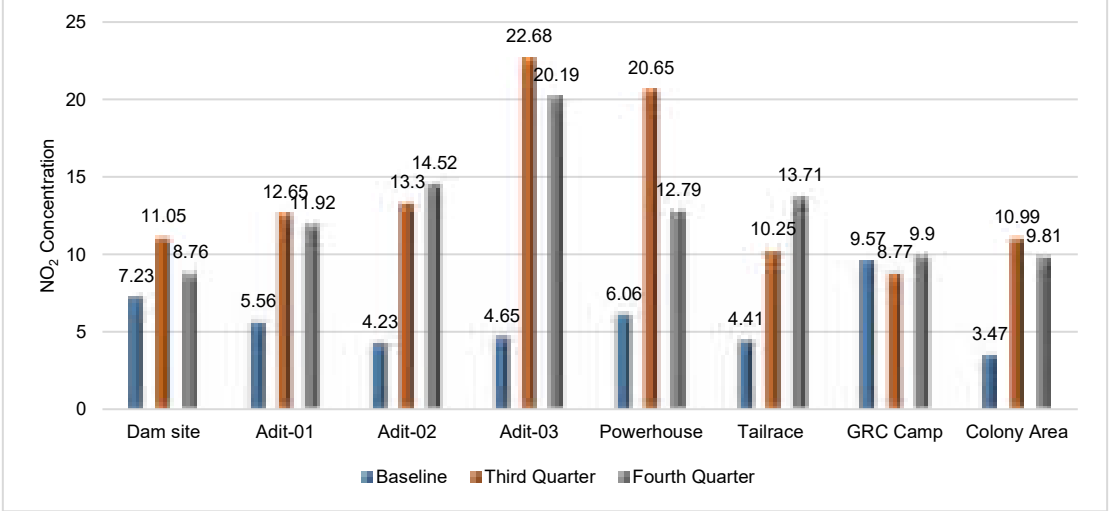
NEQS: 5 mg/m^3, WHO: 4 mg/m^3

Figure 5.7: Nitrogen Oxide (NO) (mg/m^3) Concentrations in Quarter 3 and Quarter 4 2023



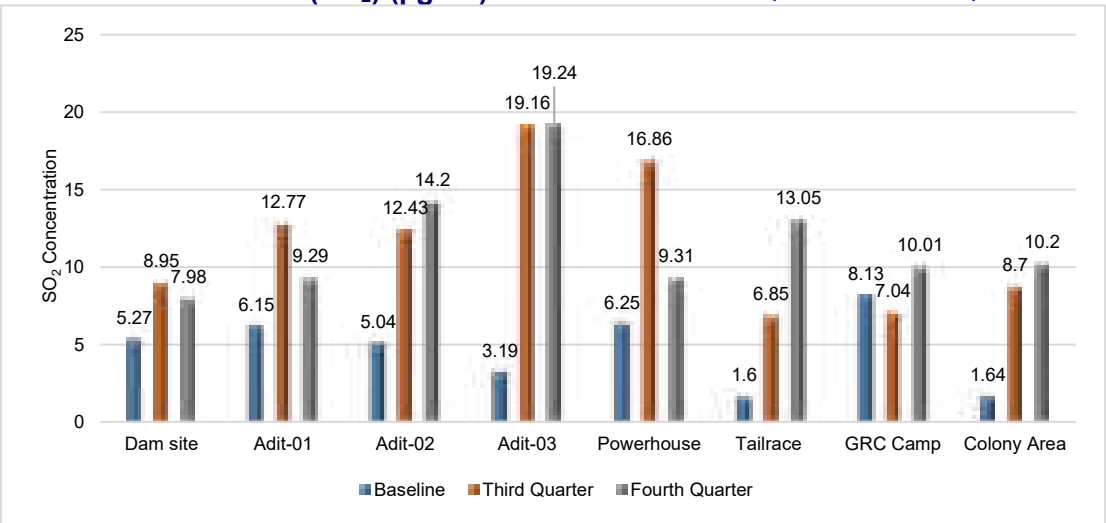
NEQS: 40 mg/m^3, WHO: 40 mg/m^3

Figure 5.8: Nitrogen Dioxide (NO_2) (µg/m^3) Concentrations in Quarter 3 and Quarter 4 2023



NEQS: 80 µg/m^3, WHO: 25 µg/m^3

Figure 5.9: Sulfur Dioxide (SO_2) (µg/m^3) Concentrations in Quarter 3 and Quarter 4 2023



NEQS: 120 µg/m^3, WHO: 40 µg/m^3

114. As clearly shown from the SO_2 emissions in **Figure 5.9**, the recorded results fell within the NEQS and WHO guideline values. The increase in concentration was mainly due to the reasons stated under other gaseous emissions.

5.3.2 Noise Monitoring

115. **Methodology.** The 24-hour noise level monitoring was carried out at the pre-identified locations as shown in **Figure 5.1**.

116. Digital sound level meter with the following specifications was employed during the noise monitoring (i) HME® 9011 Sound Levels Meter, and (ii) IEC651 Type 2 & ANISI.4TYPE2 (Japan). The **features of the equipment** are:

- Accuracy: ± 1.5 dB (under reference condition)
- Frequency range: 31.5 Hz to 8.5K Hz
- Linearity range: 50 dB
- Measuring level: 30 – 130 dB(A), 35 – 130 dB(C)
- Digital display: 4 digits
- Resolution: 0.1 dB
- Display: 0.5 secretary
- Bar graph: 50 dB scale at 1 dB step for monitoring current sound pressure level display period: 50 mS

117. **Comparison of results. Table 5.2 and Figure 5.10** show noise level monitoring results obtained during the instrumental environmental monitoring carried out during the third and fourth quarters of the reporting period. Table 5.2 also compares the two quarters of monitoring results with the baseline monitoring results.

118. The 24 hours of results for ambient noise level monitoring show that the recorded noise levels at almost all active construction sites exceeded the NEQS guideline value of 55 decibels (dB). This increase was due to the deployment and operation of heavy construction machinery at those sites.

119. Generally, the hourly results indicate that noise levels were higher during working hours, while during the off-working hours, noise levels at the monitored sites fell within the NEQS guideline value of 55 dB. Also, nighttime noise levels are generally consistent and fall within the proximity of the NEQS guiding value of 45 dB.

Table 5.2: Ambient Noise Monitoring Results in Quarter 3 and Quarter 4 2023

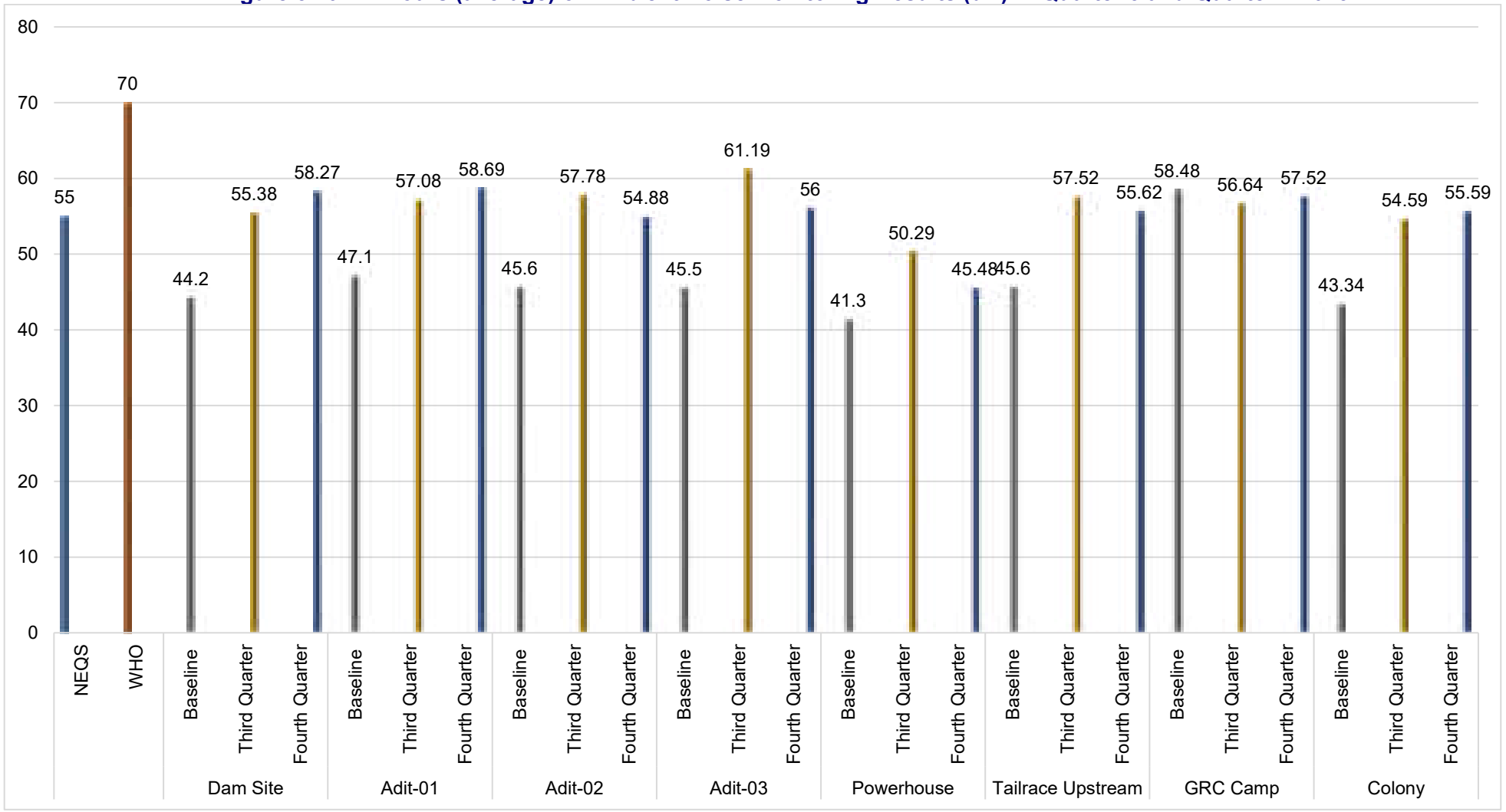
S/No	Monitoring Time	Unit	Sampling Points																					
			Dam Site			Adit -01			Adit-02			Adit-03			Powerhouse			Tailrace Upstream			GRC Camp			Colony Area		
			Results (Leq)																							
			Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter	Baseline	Third Quarter	Fourth Quarter
1.	9:00 AM	dB(A)	46.70	57.90	60.80	49.60	63.75	61.80	48.10	64.95	62.05	48.00	72.90	68.2	43.80	60.75	55.95	48.10	58.90	57.00	61.00	57.50	58.90	42.50	60.35	67.30
2.	10.00AM		46.50	57.65	60.55	49.40	63.55	61.55	47.90	64.70	61.80	47.80	74.80	70.1	43.60	60.55	55.75	47.90	60.80	58.90	60.80	59.40	60.80	43.60	61.40	69.20
3.	11.00 AM		46.30	57.40	60.30	49.20	63.35	61.30	47.70	64.45	61.55	47.60	75.15	70.45	43.40	60.35	55.55	47.70	61.15	59.25	60.50	59.75	61.15	40.90	58.70	69.55
4.	12.00AM		46.10	57.20	60.10	49.00	63.15	61.10	47.50	64.25	61.35	47.40	71.30	66.6	43.20	60.15	55.35	47.50	57.30	55.40	60.30	55.90	57.30	41.70	59.50	65.70
5.	1:00 PM		45.80	57.00	59.90	48.70	62.90	60.90	47.20	64.05	61.15	47.10	76.65	64.85	42.90	59.85	55.05	47.20	62.65	60.75	60.10	61.25	62.65	45.30	63.15	71.05
6.	2:00 PM		45.60	56.80	59.70	48.50	62.65	60.70	47.00	63.85	60.95	46.90	76.90	67.65	42.70	59.65	54.85	47.00	62.90	61.00	59.90	61.50	62.90	44.20	62.05	71.30
7.	3:00 PM		45.40	56.60	59.50	48.30	62.45	60.50	46.80	63.65	60.75	46.70	76.65	71.95	42.50	59.45	54.65	46.80	62.65	60.75	59.70	61.25	62.65	40.90	58.70	71.05
8.	4:00 PM		45.20	56.35	59.25	48.10	62.25	60.25	46.60	63.40	60.50	46.50	73.90	69.2	42.30	59.25	54.45	46.60	59.90	58.00	59.50	58.50	59.90	43.20	61.00	68.30
9.	5:00 PM		45.00	56.10	59.00	47.90	55.75	60.00	46.40	62.15	59.25	46.30	70.35	65.65	42.10	59.05	54.25	46.40	51.30	49.40	59.20	55.20	51.3	46.40	64.20	64.75
10.	6:00 PM		44.80	55.90	58.80	47.70	55.55	59.80	46.20	61.95	59.05	46.10	52.65	47.95	41.90	45.85	41.05	46.20	55.55	53.65	59.00	59.45	55.55	45.40	51.15	47.05
11.	7:00 PM		44.50	55.70	58.60	47.40	55.30	58.60	45.90	61.75	58.85	45.80	51.10	46.4	41.60	45.55	40.75	45.90	54.00	52.10	58.80	57.90	54.00	48.70	54.40	45.50
12.	8:00 PM		44.30	55.50	58.40	47.20	55.05	58.40	45.70	61.55	58.65	45.60	51.50	46.8	41.40	45.35	40.55	45.70	54.40	52.50	58.60	52.30	54.4	42.40	48.15	45.90
13.	9:00 PM		44.10	55.30	58.20	47.00	54.85	58.20	45.50	61.35	58.45	45.40	53.75	49.05	41.20	45.15	40.35	45.50	56.65	54.75	58.40	54.55	56.65	40.20	45.95	48.15
14.	10.00 PM		43.90	55.05	57.95	46.80	54.65	57.95	45.30	61.10	58.20	45.20	54.45	49.75	41.00	44.95	40.15	45.30	57.35	55.45	58.20	55.25	57.35	44.70	50.40	48.85
15.	11.00 PM		43.70	54.80	57.70	46.60	54.45	57.70	45.10	51.05	48.15	45.00	54.10	49.4	40.80	44.75	39.95	45.10	57.00	55.10	57.90	54.90	57.00	42.10	47.80	48.50
16.	12.00 PM		43.40	54.60	57.50	46.30	54.25	57.50	44.80	50.75	47.85	44.70	56.55	51.85	40.50	44.45	39.65	44.80	59.45	57.55	57.70	57.35	59.45	44.00	49.75	50.95
17.	1:00 AM		43.20	54.40	57.30	46.10	54.05	57.30	44.60	50.55	47.65	44.50	50.85	46.15	40.30	44.25	39.45	44.60	53.75	51.85	57.50	51.65	53.75	46.20	51.90	45.25
18.	2:00 AM		43.00	54.20	57.10	45.90	53.85	57.10	44.40	50.35	47.45	44.30	53.60	48.9	40.10	44.05	39.25	44.40	56.50	54.60	57.30	54.40	56.5	41.70	47.40	48.00
19.	3:00 AM		42.80	54.00	56.90	45.70	53.65	56.90	44.20	50.15	47.25	44.10	54.95	50.25	39.90	43.85	39.05	44.20	57.85	55.95	57.10	55.75	57.85	44.10	49.85	49.35
20.	4:00 AM		42.60	53.75	56.65	45.40	53.40	56.65	44.00	49.90	47.00	43.80	52.80	48.1	39.70	43.60	38.80	44.00	55.70	53.80	56.90	53.60	55.7	42.90	48.60	47.20
21.	5:00 AM		42.30	53.50	56.40	45.20	53.15	56.40	43.70	49.65	46.75	43.60	51.90	47.2	39.40	43.35	38.55	43.70	54.80	52.90	56.60	52.70	54.8	41.00	46.70	46.30
22.	6:00 AM		42.10	53.30	56.20	45.00	52.95	56.20	43.50	49.45	46.55	43.40	53.65	48.95	39.20	43.15	38.35	43.50	56.55	54.65	56.40	54.45	56.55	40.40	46.55	48.05
23.	7:00 AM		41.90	53.10	56.00	44.80	53.60	56.00	43.30	49.25	46.35	43.20	53.35	48.65	39.00	41.60	36.80	43.30	55.65	53.75	56.20	59.10	55.65	44.30	59.20	47.75
24.	8:00 AM		41.70	52.90	55.80	44.60	51.45	55.80	43.10	52.45	49.55	43.00	54.85	50.15	38.80	47.90	43.10	43.10	57.75	55.85	56.00	55.65	57.75	43.30	63.35	49.25
Average for 24 hrs			**44.20**	**55.38**	**58.27**	**47.10**	**57.08**	**58.69**	**45.60**	**57.78**	**54.88**	**45.50**	**61.19**	**56.06**	**41.30**	**50.29**	**45.48**	**45.60**	**57.52**	**55.62**	**58.48**	**56.64**	**57.52**	**43.34**	**54.59**	**55.59**

NEQS Guideline Values: 45-55 dB[4], WHO Guideline Value: 70 dB

Leq: Log Equivalent Continuous Sound Level

[4] 45 dB for Night time and 55 dB for Day time.

Figure 5.10: 24 Hours (average) of Ambient Noise Monitoring Results (dB) in Quarter 3 and Quarter 4 2023



120. As the noise source was not stationary at the monitored sites and keeping in view the heavy machinery operations, no special arrangements were needed to reduce the noise level to NEQS guiding values. Such measures were neither economical nor significant, particularly when sensitive receptors were not in the immediate vicinity of the active working sites.

5.3.3 Water Monitoring

a. Drinking Water

121. **Methodology.** During the reporting period, the drinking water quality tests were conducted at the sample points identified in the map in **Figure 5.1**.

122. American Public Health Association standard methods used for the sampling and preservation of water, and analysis. The standard methods of American Water Works Association was also used for analysis.

123. Comparison of drinking water results. The two quarters of drinking water monitoring results of the sample points, and their comparison with the baseline results are in **Table 5.3** .

124. As evident from the results of the drinking water analysis in the Project area, almost all of the monitored parameters fell within the permissible limits of WHO and the National Standards for Drinking Water Quality (NSDWQ). The minor variation in monitored parameters appears to be due to temperature/seasonal variation as drinking water was mostly extracted from natural streams in the Project area.

b. Comparison of Surface Water Results of the Kunhar River

125. For the Kunhar River water monitoring, samples were collected from three locations i.e. Dam site (upstream of temporary diversion dam, just downstream of the Sukki Kinari HPP tailrace), Tailrace upstream (Barkot), and downstream side of the Project residential colony area. The purpose of Kunhar River water monitoring is to know the river water quality at the undisturbed locations, baseline impact of the contributing streams on the river water quality, and the overall impact of the Project construction.

126. Due to non-availability of the surface water parameters under NEQS, the Kunhar River water was compared against the NEQS effluent parameters.

127. The results obtained from the instrumental environmental monitoring, carried out in the third and fourth quarter of the reporting period, are presented under **Table 5.4**. The results from first and second quarters have also been reproduced from the previous SAEMR for the period from January to June, 2023, so as to assess the Project overall impact at the end of the reporting year.

128. As evident from the table, the BOD (5) results obtained at Dam site during the first quarter monitoring, are at higher end in comparison to the results of other monitoring points of the Kunhar River. This appears to be due to the construction pollutant added to the river water by the upstream Project.

129. Although the colony and tailrace monitoring sites of the Kunhar River are located in close proximity to each other still, there is a vivid difference in the BOD (5) results obtained at these two sites. The recorded results for tailrace and downstream colony sites in Q-4 are 41.3 and 56.4 mg/l respectively. It is pertinent to mention here that just upstream of the residential colony monitoring point of the Kunhar River, there is a low flow contributing stream, namely Sangar Nullah, on left side of the River. It appears that this stream might have added pollutants to the river causing higher BOD (5) result during the last quarter of the reporting period. In any case, in the upcoming quarterly instrumental monitoring, water of this contributing stream will be analyzed for confirmation.

Table 5.3: Drinking Water Monitoring Results in 2023

S/No	Parameters	Standard Method	Units	WHO	NSDWQ	Sampling Points																										
						Dam Site					Adit -01					Adit-02					Adit-03					Powerhouse					GRC Camp				
						Results																										
						Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1.	pH	APHA-4500H+ B	--	6.5-8.5	6.5-8.5	7.4	7.6	7.5	7.3	7.7	7.7	7.4	7.54	7.6	7.5	7.3	7.3	7.4	7.6	7.5	7.7	7.62	7.4	7.2	7.7	7.5	7.46	7.6	7.3	7.4	7.7	7.67	7.61	7.8	7.9
2.	Temperature	---	°C	---	----	7	11	14	9	9	6	9	8	9	9	8	9	13	8	9	8	8	10	8	8	7	8	11	9	7	7	9	11	8	8
3.	Taste & Odor	In-house	--	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non-Objectionable	Non Objectionable	Non Objectionable	Non Objectionable	Non-Objectionable	Non-Objectionable	Non Objectionable	Non Objectionable	Non Objectionable	Non-Objectionable	Non-Objectionable	Non Objectionable	Non Objectionable	Non Objectionable	Non-Objectionable	Non-Objectionable	Non Objectionable	Non Objectionable	Non Objectionable	Non-Objectionable	Non-Objectionable	Non Objectionable	Non Objectionable	Non Objectionable	Non-Objectionable	Non-Objectionable	Non Objectionable	Non Objectionable
4.	Color	APHA-2120 B/C	TCU	≤ 15	<15	4	3	4	2	3.6	6	5	6	5	4	5	4	4	4.3	3.7	6	5	4	3	3.9	10	8	4	4	2.6	6	4	6	4	5
5.	Turbidity	APHA-2130 B	NTU	<5	<5	3	4.2	4	3.1	3.1	4	3.6	4.2	3.2	3.9	4	2.1	3	3.2	3.4	4	3	3	2	3.6	4	4	3	2	2	3	2	3	2	3.2
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	< 1000	<1000	359	326	328	339	376	381	386	390	372	371	363	359	361	359	369	377	395	387	351	388	402	382	389	379	324	384	387	379	368	359
7.	Total Hardness as $CaCO_3$	APHA-2340 C	mg/l	-------	<500	294	268	264	256	262	217	239	245	262	276	261	256	259	243	250	258	267	261	249	268	316	327	318	288	279	347	342	338	327	274
8.	Nitrate (NO_3)	APHA-4500NO3 B	mg/l	50	≤50	2.2	0.9	1	0.86	0.85	1.9	2.1	2.3	1.84	1.64	1.03	1.01	0.94	0.56	0.69	1.06	1.1	1.05	0.7	2.41	1.2	1.08	1.06	0.67	0.48	1.46	1.24	1.21	1.13	128
9.	Nitrite (NO_2)	APHA-4500NO2 B	mg/l	3	≤3	0.04	0.006	0.004	0.006	0.017	0.06	0.004	0.007	0.008	0.27	0.07	0.05	0.07	0.06	0.07	0.08	0.11	0.16	0.29	0.49	0.37	0.31	0.34	0.28	0.31	0.58	0.52	0.55	0.42	0.59
10.	Arsenic (As)	APHA-3500As B	mg/l	0.01	≤0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
11.	Nickel (Ni)	ASTM E3047-16	mg/l	0.02	≤0.02	0.001	0	N.D.	N.D.	N.D.	0.003	0	0.0012	0.003	0.015	0.005	0.002	0.001	N.D.	N.D.	0.008	0.006	0	N.D.	N.D.	0.009	0.01	0	0.003	N.D.	0.006	0.003	0.0019	0.0027	0.0046
12.	Antimony (Sb)	APHA-3500Sb B	mg/l	0.005	<0.005	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
13.	Chloride (Cl)	APHA-4500Cl- B	mg/l	250	<250	128	79	83	86.4	77.1	131	129	137	129	113	138	134	129	135	126	129	117	119	124	128.1	105	109	111	126	119.2	117	123	118	125	145
14.	Chlorine	APHA-4500 CL	mg/l		0.5-1.5	0.2	0.4	0.57	0.52	0.6	0.09	0.26	0.29	0.38	0.39	0.1	0.12	0.24	0.59	0.65	0.03	0.08	0.12	0.52	0.51	0.1	0.07	0.05	0.42	0.55	0.05	0.08	0.15	0.59	0.52
15.	Lead (Pb)	APHA-3500 Pb-B	mg/l	0.01	≤0.05	0.006	0.001	0.002	N.D	N.D.	0.001	0.009	N.D.	N.D.	N.D.	0.004	0.001	0.003	N.D.	N.D.	0.005	0.003	0.004	N.D.	N.D.	0.003	0.002	0.004	0.006	N.D.	N.D	N.D	N.D.	N.D.	N.D.
16.	Fluoride	APHA-4500F- C	mg/l	1.5	≤1.5	0.73	0.58	0.56	0.42	0.42	0.58	0.61	0.67	0.49	0.62	0.86	0.81	0.79	0.73	0.71	0.75	0.69	0.71	0.84	0.54	0.91	0.84	0.86	1.2	0.86	0.64	0.67	0.62	0.76	0.59
17.	Aluminium	APHA-3500 Al	mg/l	≤ 0.2	≤0.2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
18.	Manganese (Mn)	APHA-3500 MN-B	mg/l	0.5	≤0.5	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
19.	Cadmium (Cd)	APHA-3500 Cd-B	mg/l	0.003	0.01	N.D	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
20.	Barium (Ba)	APHA-3500 Ba B	mg/l	0.3	0.7	0.16	0.057	0.052	0.049	0.273	0.08	0.12	0.19	0.2	0.23	0.12	0.11	0.08	0.07	0.043	0.16	0.17	0.16	0.19	0.263	0.11	0.07	0.06	0.04	0.043	0.2	0.18	0.23	0.18	0.29
21.	Mercury (Hg)	APHA-3500 Hg-B	mg/l	0.001	≤0.001	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
22.	Copper (Cu)	APHA- 3500 Cu-B	mg/l	2	2	0.03	0.05	0.02	0.06	N.D.	0.07	0.06	0.072	0.058	0.071	0.04	0.03	0.027	0.035	0.049	N.D.	0.001	N.D.	N.D.	N.D.	0.06	0.02	N.D.	N.D.	N.D.	0.05	0.06	0.04	0.03	0.05
23.	Zinc (Zn)	APHA- 3500 Zn B	mg/l	3	5	1.01	1.09	1.07	1.14	1.2	1.06	1.09	1.15	1.08	1.1	1.1	1.04	1.02	1.09	1.08	1.3	1.21	1.19	1.24	1.03	1.08	1.13	1.08	1.13	1.08	1.06	1.1	1.07	0.98	0.99
24.	Boron (B)	APHA 4500 B- C	mg/l	0.3	0.3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
25.	Chromium (Cr)	APHA 3500 cr B	mg/l	0.05	≤0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
26.	Selenium (Se)	APHA- 3500 Se C	mg/l	0.01	0.01	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/l	0.07	≤0.05	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
28.	E-Coli	APHA:9222 D	Number /100 mL	Must not be detectable in any 100 ml sample	0 Number/ 100 ml	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.	Total Coliform	APHA:9222 B	Number /100 ml	Must not be detectable in any 100 ml sample	0 Number/ 100 ml	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ND = not detected, NSDWQ = National Standards for Drinking Water Quality, WHO = World Health Organization

Table 5.4: Surface Water Results of the Kunhar River in 2023

S/ No	Parameter	Standard Method	Unit	NEQS	Sampling Points														
					Dam Site					Tailrace					Colony Area				
					Results														
					Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1.	Temperature	-----	°C	40	5	7	11	7	5	6	7	13	8	6	4	7	8	11	8
2.	pH	APHA-4500H+ B	--	6.5-8.5	8.3	8.1	7.9	8.1	7.6	7.9	7.7	8.2	8.6	8.2	8.1	8.2	8.4	8.1	8.6
3.	Chemical Oxygen Demand (COD)	APHA-5220-D	mg/l	150	113	97	84	54	49	108	91.8	86	71	58	86	74.2	71	88	79
4.	Biological Oxygen Demand (BOD5) at 20 °C	APHA, 5210	mg/l	80	62.8	64.9	61.7	38.5	33.2	54.7	59.3	63.1	50.7	41.3	42	43.7	46.2	62.8	56.4
5.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	2637	2563	2176	1853	1268	2492	2281	2564	2283	1895	1864	1857	1895	2681	1947
6.	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	129	124	96	59	47	108	93	106	123	114	117	126.4	119.7	152.8	133.9
7.	Total Hardness	APHA-2340 C	mg/l	--	164	159	142	198	183	157	143	151	167	206	161	151	146	255	238
8.	Oil and Grease	Separation Method	mg/l	10	2.8	2.4	1.3	0.7	0.4	2	2.07	1.69	1.34	1.04	1.3	1.28	1.23	0.86	0.46
9.	Chromium (Hexa and Trivalent)	APHA-3500Cr B	mg/l	1	0.61	0.59	0.53	0.28	0.24	0.55	0.51	0.59	0.41	0.35	0.41	0.46	0.37	0.2	0.17
10.	Total Iron	APHA-3500-Fe-B	mg/l	8	3.8	4.1	3.6	3.1	2.9	3.2	3.04	3.88	3.37	3.26	2.6	2.58	2.51	2.69	2.52
11.	Chloride	APHA-4500Cl-B	mg/l	1000	256	261	254	219	206	234	238	249	195	237	209	216	234	263	249
12.	Fluoride	APHA-4500F-C	mg/l	10	2.4	3.02	2.97	3.11	2.88	1.8	1.75	1.81	2.1	2.55	1.1	1.19	1.21	1.71	1.68
13.	Ammonia	ASTM-D1426-15	mg/l	40	4.9	5.2	5.8	3.5	3.07	3.7	3.6	3.2	3.92	3.41	2.9	3.2	3.4	3.9	4.1
14.	Cadmium	APHA-3500 Cd-B	mg/l	0.1	0.01	0.009	0	N.D	N.D	0.008	N.D	N.D	N.D	N.D	0.006	N.D	N.D	N.D	N.D
15.	Lead	APHA-3500-Pb B	mg/l	0.5	0.08	0.04	0.01	N.D	N.D	0.03	0.007	0.005	N.D	N.D	0.01	0.009	0.0079	0.003	0.007
16.	Arsenic	APHA-3500As B	mg/l	1	N D	N D	N D	N.D	N.D	N D	N D	N.D	N.D	N.D	N D	N D	N.D	N.D	N.D
17.	Copper	APHA-3500Cu B	mg/l	1	0.27	0.21	0.18	0.24	0.16	N D	N D	N.D	N.D	0.03	N D	N D	N.D	N.D	N.D
18.	Barium	APHA-3500Ba B	mg/l	1.5	0.07	0.09	0.07	0.09	N.D	0.04	0.02	0.09	0.12	0.08	0.03	0.006	0.0071	0.0052	0.0049
19.	Selenium	APHA- 3500 Se C	mg/l	0.5	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N D	N.D	N.D	N.D	N.D
20.	Silver	APHA-3500Ag-B	mg/l	1	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N D	N.D	N.D	N.D	N.D
21.	Manganese	APHA-3500-Mn B	mg/l	1.5	0.33	0.37	0.34	0.29	0.15	0.28	0.31	0.28	0.37	0.31	0.26	0.24	0.22	0.13	0.16
22.	Zinc	APHA-3500-Zn B	mg/l	5	0.58	0.64	0.59	0.46	0.39	0.37	0.42	0.46	0.57	0.42	0.31	0.29	0.33	0.47	0.39
23.	Nickel	ASTM E3047-16	mg/l	1	0.15	0.12	0.13	0.16	0.09	0.11	0.08	0.09	0.04	0.06	0.08	0.05	0.03	0.008	0.004
24.	Boron	APHA-4500B-C	mg/l	6	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
25.	Mercury	APHA-3500 Hg-B	mg/l	0.01	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N D	N.D	N.D	N.D	N.D
26.	Sulphide (S^{-2})	APHA-4500 S_2	mg/l	1	0.35	0.32	0.29	0.33	0.26	0.31	0.28	0.37	0.31	0.37	0.29	0.24	0.16	0.29	0.3
27.	Sulphate (SO_4)	APHA-4500-SO_4 C	mg/l	600	429	425	406	346	271	354	349	356	381	354	349	342	356	345	339
28.	An Ionic Detergent (as MBAS)	----	mg/l	20	1.1	1.03	1.01	0.85	0.73	0.9	0.7	1.06	1.13	1.04	0.4	0.6	0.57	0.61	0.54
29.	Phenolic Compound (as Phenol)	APHA-5530-D	mg/l	0.1	0.06	0.04	0.06	0.03	0.01	0.02	0.01	0.04	0.08	0.06	0.01	0.01	0.013	0.016	0.012
30.	Cyanide (as CN) total	APHA 4500-CN	mg/l	1	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N D	N.D	N.D	N.D	N.D
31.	E-Coli	APHA:9222 D	Number/ 100 ml	---	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable
32.	Total Coliform	APHA:9222 B	Number/ 100 ml	---	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable	Uncountable

ND = not detected, NEQS = National Environmental Quality Standards

Table 5.5: Soil Analysis Results in 2023

S/No	Parameters		Sampling Points and Results																								
			Adit-01					Adit-02					Adit-03					GRC Camp					Powerhouse				
			Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Baseline	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1	Soil Texture	Sand %	14	13	19	21	26	8	10	13	17	29	17	21	19	23	22	16	15	17	21	19	12	14	16	19	24
		Silt%	57	54	49	53	57	58	53	49	46	40	49	56	53	55	51	43	46	45	49	52	61	59	57	52	33
		Clay %	29	33	32	26	17	34	37	38	37	31	34	23	28	22	27	41	39	38	30	29	37	27	27	29	43
		Texture Class	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam	Silty Clay Loam
2	pH		8.1	8.1	8.1	7.9	8.4	8.4	8.1	8.1	8.6	8.1	8.1	8.0	8.0	8.3	8.4	8.0	8.0	8.0	8.1	8	8.1	8.1	8.1	8	8.3
3	Electrical Conductivity EC (μSm^{-1})		238	238	238	245	251	251	238	238	233	239	238	231	231	236	248	231	231	231	236	244	229	229	229	241	256
4	Phosphorus ($mgkg^{-1}$)		2.01	2.01	2.01	1.98	1.64	1.64	2.01	2.01	2.2	2.47	2.01	3.2	3.2	2.95	2.59	3.2	3.2	3.2	3.81	3.79	2.9	2.9	2.9	2.87	2.8
5	Sodium Absorption Ratio		4.07	4.07	4.07	3.96	3.53	3.53	4.07	4.07	4.18	3.19	4.07	3.54	3.54	3.47	3.24	3.54	3.54	3.54	3.64	3.64	3.37	3.37	3.37	3.33	4.05

μSm^{-1}: Micro siemens/meter
$mgkg^{-1}$: milligram per Kilogram

5.3.4 Soil Analysis

130. During the course of quarterly instrumental environmental monitoring, the soil analysis of camps and workshop areas was also carried out to record conditions of the soil at these sites, and track changes resulting from construction activities. Thesewould obligate the EPC Contractor to restore the soil of the facilities to its original condition upon completion of the Project or handing over the site back to the owner(s).

131. Comparison of the soil analysis results obtained during the reporting period are in **Table 5.5**. The first and second quarter results have also been given to examine the Project construction activities' effect on the soil quality at the end of the reporting year.

132. As evident from the results, there was a gradual increase in the percentage of the sand contents in the soil at almost all of the monitored points, exhibiting increase in construction activities. Other monitored parameters more or less remained the same at all sites.

5.3.5 Trends

133. Due to propagation of construction activities, and deployment of heavy construction machinery at Site, increased noise levels and particulate matter concentration were recorded at most of the monitored points. As the EPC Contractor undertook earthwork activities involving cutting of slopes, land leveling for colony areas and access roads, such increase was anticipated. Similarly, at all active construction sites, there was an increase in gaseous emission during the reporting period.

134. Despite the quick increase in the primary pollutants, most of the recorded results fell within the acceptable limits of NEQS.

135. With opening of the new sites for construction and deployment of heavy machinery, the impact on ambient noise level and air quality was anticipated. However, such increase will be minimized through implementation of mitigation measures specified in the EMP/SSEMP to curtail primary pollutants.

Air and noise monitoring at Dam and Adit-02 Camp (Third and Fourth Quarters, 2023)

Drinking water monitoring-Community and GRC Camp site (Third Quarter 2023)

Kunhar River Sampling u/s Dam site (Third Quarter, 2023)

Soil Sampling at A-02 Camp (Third Quarter, 2023)

5.3.6 Summary of Monitoring Outcomes

136. The instrumental environmental monitoring results show that weather conditions, type of construction activities, and deployment of heavy machinery collectively affected the baseline conditions of the Project area. However, the impact is short term associated with the construction period as evident from the comparison between the hourly noise levels and particulate matter concentration results obtained during working and off- working hours.

137. As evident from the air monitoring, the increase in gaseous emissions recorded at Site was also caused by the increase in vehicular traffic on N-15 during the tourism season. Almost all of the Project facilities are identified along the N-15 route, and at the left bank of the Kuhar River which runs parallel to the aforementioned route.

138. No doubt, construction activities will affect the Project area's air quality and noise levels. However, the impact of tourism on vehicular traffic cannot be ignored.

139. To suppress fugitive dust at Site, water sprinkling intensity has significantly been increased, particularly at adit tunnels, and access roads.

5.4 Waste Management

140. During the reporting period, the Kaghan Development Authority (KDA) granted NOC to the EPC Contractor to dispose general/kitchen waste at their designated sites. Copy of the NOC is in **Annexure-05**. KDA also supplied waste collection containers at various locations, particularly near camps and workshops. KDA regularly collected waste from these containers, and transported them to the designated sites for further disposal.

141. Also, the EPC Contractor designated specific points within the camp for collecting kitchen and domestic waste. These points were clearly marked and easily accessible to camp

occupants and staff. As evident from the picture below, color-coded bins were used to collect solid waste within the camp(s).

142. Moreover, the EPC Contractor committed to promote waste reduction and recycling practices within the camps through actively engaging camp occupants to adopt sustainable practices, such as composting food scraps and recycling materials whenever possible. By raising awareness and providing necessary infrastructure facilities, they strived to create a culture of environmental responsibility among all camp members.

KDA-Supplied Waste Containers and Color-Coded Bins

143. **Tables 5.6 and 5.7** show month-wise and cumulative details of waste generated at camp(s) and sites.

Table 5.6: Solid and Lubricant Waste Generated at Camps and Sites

S/ No	Type of Waste	Quantity			Disposal
		This Reporting Period	Previous Reporting Period	Cumulative	
1	Plastic waste	17.5 kg	22 kg	39.5 kg	Collected in the KDA supplied waste container and then transported to the approved waste disposal site.
2	Used tyres	55 Nos	10 Nos	65 Nos	Stored in junk yard (to be auctioned)
3	Used wooden sheets	0 kg	0 kg	0 kg	Not produced yet
4	Used engine oil	1243 ltr	30 ltr	1273 ltr	Stored in barrels.
5	Biodegradable waste (vegetables, food etc)	460 kg	50 kg	510 kg	Through KDA, for further processing and composting.

Table 5.7: Medical Waste and Sorbents Generated at Camps and Sites

S/No	Month	Medical Waste (kg)	Contaminated Sorbents (kg)
1	July	0.3	0
2	August	0.2	0
3	September	0.4	0
4	October	0.3	0
5	November	0.5	0
6	December	0.7	0
Total for Reporting Period (July-December 2023)		2.4	0
Total for Previous Reporting Period (Jan-June 2023)		1.0	0
Cumulative for the Project		3.4	0

144. As evident from **Table 5.6**, compared to the previous reporting period, there was a vivid increase in generated used lubricants and biodegradable waste at camp(s). This indicates the marked increase in initiating/executing construction activities at various sites.

145. Although the waste lubricant stored in containers at designated location was mainly used for lubrication of formwork, the surplus was kept in containers for onward selling to the government-approved vendor.

146. As expounded above, biodegradable waste generated at camps was collected in large containers provided by KDA from where it was regularly transported to the approved disposal site.

147. The medical waste generated at camp(s) was intended to be disposed at the incinerator facility at the district/tehsil hospital. As apprised during the previous reporting period, the EPC Contractor applied for disposal of medical waste to the quarter concerned at the district level. However, despite consistent follow up, the NOCwas yet to be issued. To resolve the issue, PMC and PIU will assist EPC Contractor through requesting the competent authority to issue the NOC at the earliest. With the progress of work, more and more worker will be deployed which may increase medical waste generation. Deputy Director HSE and Gender of PIU and the EPC Contractor's Health and Safety Manager will visit the quarter concerned in the second half of January 2024.

148. For the primary treatment of the camp sewage, the EPC Contractor constructed a septic tank wherein sewage was being treated under anaerobic conditions. Also, provision exists for a drain to discharge storm water from the camp.

149. As far as safe disposal of hazardous waste is concerned, under the ADB instruction given in a meeting on September 14, 2023 at the EPC Contractor's A-02 Camp, the PMC searched for a government-approved vendor. However, they could not find any in the District Mansehra or elsewhere in the province. The constraint was accordingly intimated to ADB during the safeguard handover Mission on December 18, 2023 at PEDO House, Peshawar. ADBassured its support to find the government-approved vendor from Punjab province, whose contact number will be shared with the PIU/PMC at the earliest.

150. No ground water contamination was observed as a consequential effect of the EPC Contractor's waste management aspect of the SSEMP.

5.5 Health and Safety

5.5.1 Community Health and Safety

151. During the reporting period, the EPC Contractor undertook a number of initiatives towards the community's health and safety. Utmost efforts were made to construct temporary facilities like camp, batching plant, and workshop at locations isolated from the nearest community to minimize risks associated with such facilities. For example, A-02 camp, batching plant, workshop and magazine at Ganhool Nullah, and GRC camp at Sangar village have been constructed in complete isolation from the community. All these facilities have dedicated approach roads guarded by the Special Security Unit.

152. Before starting construction activities, particularly at the residential colony and dam sites, the EPC Contractor held consultations with the nearby community wherein the Project layout, nature of activities and machinery to be deployed were discussed in detail. Information dissemination regarding Project activities, associated risks, and safety arrangements was the prime objective of such consultations.

153. To maintain privacy of the houses near the construction sites, green shade nets were provided to locals on demand.

154. The unpaved access roads used by the Contractor's vehicles were sprinkled to suppress dust, and protect general commuters from the related impacts. The sections of katcha tracks exposed to excess particulate matter concentration were particularly sprinkled

more frequently. For example, the access road (R-03) to colony and powerhouse, and access road to Adit-03 were regularly sprinkled to suppress dust emanating from the heavy machinery movement. However, there were isolated instances where particulate matters exceeded the allowable limits during application of shotcrete to strengthen the loose slopes and land leveling for roads and colony.

155. Although construction activities were carried out during nighttime, such activities did not create nuisance to the locals as they were mainly undertaken inside adit tunnels.

156. Throughout the construction sites, warning signs/messages in English and Urdu languages were displayed at appropriate locations. Also, flagmen were deployed at the access roads off taking from N-15.

157. Camps, workshops, batching plants and work areas were cordoned off with gates and fences to prohibit unauthorized entry to these facilities.

Green sheds provided as part of the EPC Contractor's initiative to protect cultural norms

5.5.2 Workers Health and Safety

158. PPE were provided to all workers while Site supervisors ensured their proper use.

159. To encourage workers to regularly follow safety protocols and implement safety measures at works site, champion programs were regularly held whereby cash awards were distributed . Usually, three skilled/unskilled labor/staff from the EPC Contractor's workforce who regularly followed safety protocols and encouraged other staff to do so were selected as HSE champions of the month.

Prize Distribution under HSE Champion Program (July 2023)

160. For the construction workers, the EPC Contractor conducted trainings on safety issues with practical demonstration of response to any emergency.

161. Before starting the work, toolbox talks on HSE-related issues were regularly held.

162. The EPC Contractor arranged Annual OHS training on August 8 and 9, 2023 at the Project Site. The two-day training imparted by professionals of the Rescue 1122 of District Mansehra was participated by relevant staff from PIU, PMC and the EPC Contractor's HSE staff and supervisors from work sites, workshop and batching plant, etc.

163. During the reporting period, First Aid Box was provided for any incident/emergency situation. First Aid Boxes were made available at all work sites.

164. To respond to fire outbreak, fire extinguishers were made available at the camps, batching plants and laboratory/offices, etc.

165. After repeated instructions and followups, the EPC Contractor supplied clean drinking water to the workers both at the camps and sites. As exhibited by the environmental monitoring results, drinking water complied with the NSDWQ. Also, the EPC Contractor's camps were equipped with all basic necessities, like accommodation, dining halls, sanitation, and games.

166. Under the provisions of the EPC contract, medical dispensary was provided at the camp (although not fully equipped) where the EPC Contractor ensured round-the-clock presence of a medical practitioner. The medical practitioner maintained stock and record of medicines received and used, patient named, and typed of diseases etc.

167. **Table 5.8** exhibits month-wise patient records and types of common diseases treated at the dispensary.

168. Although the medical dispensary is not fully equipped (EPC Contractor is yet to hire a full-time PMDC-registered doctor), the medical practitioner administered medicines to patients suffering from common headache, vomiting, or stomach pain, etc. As evident from the record, during the reporting period, two patients were referred to the DHQ and THQ hospital Balakot for further treatment. The EPC Contractor fully assisted the patients in availing medical treatment from each hospital.

169. The types of illnesses reported by the patients included flu, fever, vomiting, headache, and stomach pain etc.

Table 5.8: Patient Records for the Current Reporting Period

S/No	Description	July	Aug	Sep	Oct	Nov	Dec
1	Number of patients treated at Camp Medical Facility	66	120	192	233	199	255
2	Number of patients referred to DHQ Hospital, THQ Balakot	0	0	0	1	0	1
3	Type of illness	Stomach pain	Flu, Fever				Cough, skin rashes
		Sore throat	Vomiting			Abdominal pain	fever
		Flu and cough	Hypertension				flu
		Headache					

170. Also, Table 5.8 shows that due to the increase in the EPC Contractor's workforce, more and more patients availed of the services of the dispensary with each passing month.

5.6 Implementation Status of Environmental Management Plan

171. **Table 5.9** shows the implementation status of the pre-construction and construction phase mitigation measures in the disclosed EIA report of the Project, while implementation status of corrective actions proposed in the previous monitoring period was given separately**.**

Table 5.9: Implementation Status of EMP (Pre-construction and Construction Phases)

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
Pre-Construction Phase						
1	Terrestrial habitat loss caused by construction related activities	Minimize disturbance to, or movement of, soil and vegetation	Yes			
		Minimize project footprint.	Yes			
		Retain as much natural vegetation as possible.	Yes			
		Locate construction facilities based on a knowledge of the soil.	Yes			
		slope and vegetation cover of the area to avoid disturbance to the natural environment	Yes			
2	Decline in abundance and diversity of terrestrial flora and fauna caused by construction related activities	Locate vehicle yards away from open soils and top soil stockyard	Yes			
		Maximize use of locally-sourced aggregate and borrow material	Yes			
		Minimize contact of non-local aggregate and borrow material with native soil.	Yes			
		Minimize disturbance to, or movement of, soil and vegetation.	Yes			
3	Blasting may pose a health hazard due to flying debris	A minimum buffer of 500 m should be provided between the settlements and point of blasting.	Yes			
4	Construction activities may be cause alterations to groundwater flow patterns	Record location of the springs especially those in areas proximal to where the underground headrace tunnel will be closer to the ground level		Partial	EPC Contractor submitted Hydro-census Report in November 2023. The PMC review comments are yet to be addressed by the Contractor.	Final Hydro-census Report submission by **January 20, 2024**.
5	Use of local water resources for construction activities may reduce the water	Prepare a Water Sourcing and Abstraction Plan specifying the source, owner, total yield, current usage, allowable quantity and the duration for which water can be obtained.	Yes[5]			

[5] Water source permission(s) and other details annexed to the SSEMP.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
	availability for the local communities.	To the extent possible avoid, and where unavoidable, minimize the use of water from local sources (springs) for the Project where local abstraction is unavoidable	Yes			
		Undertake an assessment of the local source identifying its total yield and current usage. If the abstraction from a single source extends three months, the assessment shall be repeated	Yes			
		Fix the allowable quantity to not more than 50% of the available yield (total yield minus current usage)	Yes			
		Enter into a formal agreement with the owner for the water source (or government if it is a public source)	Yes			
6	Increase in ambient noise levels due to operation of construction equipment, movement of construction traffic and blasting may create nuisance for nearby communities and visiting tourists.	Use visual alarms in preference to audible alarms.	Yes			
		Locate noisy equipment behind parking lots, parks or behind sound barriers or sound absorbers – for example, gravel stockpiles or constructed barriers. and away from potential sources of conflict	Yes			
		Using vibratory piling instead of impact piling.	Yes			
		Erect earth mounds around the site boundary can provide acoustic as well as visual screening	Yes			
7	Failure of spoil dumping sites resulting in increased erosion and sediment load entering river	Dumping sites should have a flood prevention design for a 20- year flood		Partial	In response to the EPC Contractor's report containing sites identified for muck disposal, the PMC EE undertook due diligence of the identified sites in September 2023. Consequently, out of 10 identified sites, only one site was found suitable subject to construction of protection and	The EPC Contractor hired services of NESPAK Consultant for identification of suitable muck disposal sites. NESPAK has undertaken field visits while report containing new sites will be submitted to the PMC

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
					drainage works while rest were either found unfeasible or required costly access and huge protection works.	for review by **January 25, 2024.**
		Preparation of spoil management plan	Yes			
8	Permanent impact in aesthetics due to proposed developments	Develop and implement a Site Rehabilitation and Landscaping Plan	Yes			
		Use colors that better integrate with the landscape	Yes			
		Disguise elements with vegetation where possible	Yes			
		Retain as much natural vegetation as possible	Yes			
9	Improved accessibility due to construction of Project internal roads	Consult communities during final design and location of site access roads	Yes			
10	Increase in congestion, due to increased traffic volume will cause delays	Make roundabouts for the congestion points.	Yes			
		Retain as much natural vegetation as possible to reduce the impact of smoke due to vehicles.	Yes			
		Consult National Highway Authority for implementation of the above measures	Yes			
11	Loss of assets and livelihood as a result of land acquired for the Project	LARP implementation		Partial	LARP implementation is in progress.	
12	Submergence of the graveyard	Plaster the graves with mud or cement.		No	LARP implementation is in progress. The affected community and the district administration have not yet decided whether to shift the graves or not or when to shift the graves. In this regard, a committee has been notified (notification attached as	

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
					Annexure-06) comprising of community representatives, representatives from district administration and the Balakot HPP (300 MW), with the mandate to resolve the matter align with religious and local acceptable.	
		If relocation of the graveyard cannot be avoided, it shall be managed through the local religious authorities.		No	Same as above.	Same as above
13	Impact of climate change in possible enhancing of flood impacts such as during possible overtopping of spillway	Ensure minimal damage to dam structure from small amount of overtopping of spillway through design	Yes			
Construction Phase						
1	Construction Impacts	SSEMP exhibiting areas to be cleared, vegetated areas to be protected or fenced, slopes to be stabilized and solid waste disposal locations.	Yes			
2	Improvement of the river ecosystem through implementation of the BAP Loss of riverine ecosystem due to inundation by Project Reservoir Degradation of the river ecosystem in the low flow segment downstream of the Project dam	Implement BAP		Partial	• The works related measures have been taken by the EPC Contractor while for the protection measures in the Area of Management, focal persons have been notified by both the departments while field office for fisheries department has been identified. The SDFO (Wildlife) Balakot office has been proposed for the Wildlife protection activities.	Signing of contract and field activities will be initiated after the Bank concurrence to the updated EIA report (See Corrective Action Plan).

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
	Degradation of the River Ecosystem Downstream of the Tailrace Terrestrial habitat loss caused by construction related activities.				• EIA report has been updated to reflect changes in the BAP implementation arrangement and BAP Management Committee composition.	
3	Terrestrial habitat loss caused by construction related activities.	Provide awareness training to staff and contractors on: prevention of injury of animals; identification of likely species found on site; identifications of animal hazards (such as venomous snakes); and what to do if dangerous animals are encountered	Yes[6]			
		Solid waste should only be disposed of at designated sites and a Waste Management Plan developed and implemented.	Yes			
		Prepare an Environmental Training Plan that contains awareness training to staff and contractors on: prevention of injury of animals; identification of likely species found on site; identifications of animal hazards (such as venomous snakes); and what to do if dangerous animals are encountered. Also see guidelines for the Environmental Training Plan in IR 5	Yes			
		Encourage personnel to report sightings of wildlife of conservation importance or incidents of poaching to PEDO	Yes			
		Minimize disturbance to, or movement of, soil and vegetation	Yes			
		Prevent soil damage and erosion				
		Prevent Alien Invasive Species (AIS) establishment on exposed stored soil (do not store bare soil near known sources of AIS).	Yes			

[6] Annual OHS held on August 8 and 9, 2023

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		The habitat most at risk is the Riparian Habitat. The species that are highest risk include Parthenium Weed, Common Weed and Castor Oil Plant				
		Train and raise awareness regarding AIS among Project staff and contractors				
		Retain as much natural vegetation as possible				
		Solid waste should only be disposed of at designated sites	Yes			
		Minimize the project footprint, clearly delineate and restrict access beyond work sites and other areas to be disturbed				
		Within the quarry and borrow areas, activities will be restricted to areas at a distance from perennial water channels so as to avoid disturbances to them including the risk of siltation	Yes			
4	Decline in abundance and diversity of terrestrial flora and fauna caused by construction related activities.	Large flood lights should not be installed outside 50 m of the Project fence.	Yes			
		Lights should be directed towards Project facilities and not towards the natural habitats.	Yes			
		Regulations for Project staff and contractors to avoid illegal poaching to be incorporated in contract documents	Yes			
		Provide awareness training to staff and contractors on: prevention of injury of animals; identification of likely species found on site; identifications of animal hazards (such as venomous snakes); and what to do if dangerous animals are encountered.	Yes			
		Incorporate regulations for Project staff and contractors to avoid illegal poaching in contract documents	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		Provide adequate knowledge to the workers on relevant government regulations and punishments for illegal poaching.	Yes			
		Encourage personnel to report sightings of wildlife of conservation importance or incidents of poaching to PEDO	Yes			
		Project staff and contractors to report kills of large mammals particularly designated species of conservation concern	Yes			
		Train and raise awareness regarding AIS among Project staff and contractors	Yes			
		The Contractor shall prepare an Environmental Training Plan for all construction workers: the Plan shall address the following items: • All Contractor's employees shall be required to comply with environmental protection procedures and they shall be able to provide evidence that they attended the training sessions detailed in the Plan; • The Plan shall educate all construction workers on the following issues but not limited to them: fire arm possession, traffic regulations, illegal logging and collection of non-timber forestry products, non-disturbance of resettlement communities, hunting and fishing restrictions, waste management, erosion control, health and safety issues, all prohibited activities, the Code of Conduct requirements and disciplinary procedures, and general information on the environment in which they will be working and living • Proposed methods for conducting the training program, which shall include formal training sessions, posters, data in	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		newsletters, signs in construction and camp areas and 'tool box' meetings				
		Equipment emitting excessive noise in comparison with other similar equipment will not be allowed to operate	Yes			
		Equipment under use will be regularly maintained, tuned, and provided with mufflers to minimize noise levels.	Yes			
		Equipment in poor state of maintenance, particularly without effective noise control will be checked to determine if it can be improved, and replaced with less noisy equipment as soon as practicable	Yes			
		Blowing of horn will be prohibited on all sensitive areas except under emergency conditions	Yes			
		Compensatory trees will be planted. The EPC Contractor will plant a minimum of ten trees for each tree removed in acquired land. PEDO will monitor and maintain the vegetation until it is established.		Partial	The EPC Contractor prepared Tree Plantation Plan (TPP) and submitted to the PMC for review. The revised submission, updated in light of the PMC review comments, is under review.	Reviewed TPP will be submitted by **January 14, 2024** to PIU for further review and onward submission to the relevant quarters at ADB.
5	Increase in ambient and ground level concentration of air pollutants from construction activities and vehicular movement may cause health impacts to the community.	Develop and implement an Air Pollution Control Plan	Yes[7]			
		Prepare a SSEMP (see **Section 9.5.3**) for each construction site and must outline areas to be cleared, vegetated areas to be protected or fenced, solid waste disposal locations, and sprinkling locations	Yes			
		Fugitive and exhaust emissions from transport vehicles:	Yes			

[7] Air pollution plan is part of the SSEMP.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		♦ Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer). ♦ Install and maintain all vehicles and machinery with appropriate emission control equipment. ♦ Regularly maintain vehicles and equipment to keep emissions in check. ♦ Smoke from internal combustion engines should not be visible for more than ten seconds. ♦ To the extent possible, use new and low emission equipment and vehicles. ♦ Purchase best quality fuel and lubes and where possible use lead free oil and lubes. ♦ Sprinkle water on all unsealed roads used by Project vehicles that are within 200 m of any settlement. ♦ Cover loads and long-term piles of friable material to reduce fugitive dust emission. ♦ Reduce traffic speeds on all unpaved surfaces to 15 miles per hour or less. ♦ Paved roads shall be swept frequently if soil material has been carried onto adjacent paved, public thoroughfares from the Project site. ♦ Install wheel washers where vehicle exit onto paved road from unpaved. ♦ Wheel washing of vehicles leaving the site. ♦ Wash vehicles/equipment prior to each trip. ♦ Use catalytic converters on vehicles, an emission control device, used to convert harmful pollutants to less harmful pollutants				

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		e.g. it converts the nitrogen oxides back into nitrogen and oxygen. ♦ Appropriate maintenance of vehicles and machinery				
		Fugitive dust emissions from blasting ♦ Indicate the limits of a clearing land with highly visible markers. ♦ Leave a layer of about 5 m of undisturbed softs above the top of the overburden blasts. This will act as a blanket to contain air blast, dust and fly rock. ♦ Sprinkle water on the area where blasting is done to settle down the particulate matter emissions.	Yes[8]			
		Fugitive dust emissions from quarry areas ♦ Indicate the limits of a clearing land with highly visible markers. ♦ Avoid earth stripping or moving in periods of dry and windy weather. ♦ Carry out dust generating activities where maximum protection can be obtained through topography or in areas where prevailing winds will blow dust away from sensitive areas/uses. ♦ Water spraying of conveyors/conveyor transfer points, stockpiles and roads. ♦ Covering of fine dry loads or spraying of loads prior to exiting the site, and if necessary regular cleaning of public roads in the vicinity of the entrance.	Yes[9]			
		Fugitive dust emissions from concrete batching plants	Yes			

[8] The Headrace tunnel blasting operation has not yet been started however, the site-specific mitigation measures are included in the SSEMP. Need based sprinkling done to prevent fugitive dust emission.

[9] Construction materials are being supplied from the government approved sources which are located outside of the Project area.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		• Suspend earthwork operation when wind speed exceeds 20 km/hr. in areas within 500 m of any settlement. • The whole process of weighing and mixing would be performed in a fully enclosed environment. • The mixers would all equip with dust collectors, no dust emission would be expected. • Siting the concrete batching plant out of prevailing high winds minimizing dust emissions. • The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in the leeward direction to minimize the effects of the wind. • The provision of natural or artificial wind barriers – such as trees, fences and landforms – to help control the emission of dust from the plant should be considered. • Batching plants should be sited on land that is not flood prone. • Batching plant should be kept as near to natural sinks to minimize emissions to ambient environment • All stacks to be vertical and at least 3 m above ground				
		Fugitive dust emissions from aggregate production and handling system • Suspend operation when wind speed exceeds 20 km/hr. in areas within 500 m of any settlement. • The prevailing wind direction should be considered to ensure that aggregate handling systems located in the leeward	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		direction to minimize the effects of the wind. ♦ Sprinkle water on all exposed surfaces, particularly those close and up-wind of settlements.				
		Wind-blown dust from exposed surfaces such as bare land and waste dumping sites ♦ Cover all exposed surfaces, particularly those close and up-wind of settlements. ♦ All grading operations on a project should be suspended when winds exceed 20 miles per hour. ♦ Minimize disturbance to, or movement of, soil and vegetation. ♦ Sprinkle water on all exposed surfaces, particularly those close and up-wind of settlements. ♦ Retain as much natural vegetation as possible	Yes			
		Wind-blown dust from stockpiles of dusty materials such as sand and other minerals ♦ On-site dirt piles or other stockpiled PM should be covered, wind breaks installed and water and/or soil stabilizers employed to reduce wind-blown dust emissions. ♦ Adequately wet, cover with plastic, or provide with wind shield all stockpiles to reduce dust emission. ♦ Sprinkle water on all exposed surfaces, particularly those close and up-wind of settlements. ♦ Minimize disturbance to, or movement of, soil and vegetation. ♦ Prevent soil damage and erosion. ♦ Retain as much natural vegetation as possible	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
6	Vibration from blasting during the construction phase may disturb local communities.	Develop a Blasting and Explosives Management Plan and Vibration Monitoring Plan.		Partial	In December 2023, the EPC Contractor submitted Blasting Management Plan (BMP) for the PMC review.PMC traded review comments whereby EPC Contractor re submitted the updated BMP which is under review.	Reviewed BMP will be submitted by **January 14, 2024** to PIU for further review and onward submission to the relevant quarters at ADB.
		♦ Conduct a pre-construction survey of structures at risk of vibration impacts households. ○ In the initial stages, the blasting induced vibration shall be measured as a function of maximum instantaneous charge and distance from the blasting site. This data shall be then used to refine the Blasting Induced Vibration Risk Zones on the basis of the adopted criteria. ○ Using, the refined Blasting Induced Vibration Risk Zones maps and the tunnel boring schedule, the Supervision Consultant in consultation with the PEDO and the Construction Contractor, shall identify the houses that will be affected and the impact duration and schedule. ○ For the houses that will fall in the Structural Damage Risk Zone, a temporary relocation plan will be developed. An amendment to the Land Acquisition and Resettlement Plan (LARP) will be commissioned for this purpose. Before start of blasting, all residents of houses in the Structural		Partial [10]	• The aspect termed as partial because blasting operation has not initiated yet, nevertheless, the houses/infrastructure falling within the ROW have already been accounted for compensation under LARP. • The potentially affected housed/infrastructure falling in the blasting impact zone and outside of the ROW will be surveyed after approval of method statement.	

[10] Survey will be conducted for marking the potentially affected houses/infrastructure falling in blasting impact zone.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		Damage Risk Zone will be relocated as per the LARP. ○ A survey will be undertaken in both zones, to determine the pre-blasting conditions of the buildings. The survey will be commissioned by the Supervision Consultant and will identify and record any existing damage to the structures. The survey will cover the following aspects: ➢ Overall condition of the structures, both exterior and interior. ➢ Documentation of defects observed in the structure using digital imagery along with notes, measurements and sketches. ➢ Documentation of pre-existing cracks using digital imagery along with notes, measurements and sketches.				
		♦ Following completion of the blasting, the survey will be repeated in the Structural Damage Risk Zone to determine the condition of the buildings and verify that they are safe for re-occupation. If the buildings are safe, the residents will be allowed to return to their houses following any necessary damage repairs. If the buildings are damaged beyond repair, compensation will be paid to the owners as per the LARP. If there are any claims or reports of damage in the Cosmetic Damage Risk Zone, the affected house will be surveyed against the pre-Project survey		No[11]		

[11] Not due for initiation.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		and repairs will be undertaken as appropriate.				
		♦ Meaningful contact with the community shall be maintained and their grievance shall be attended to in a timely manner. In this regard: o A meaningful community engagement plan will be developed. The plan will cover identify the affected community; the key contact persons; frequency of engagement; the information to be shared; the responsibilities to manage the plan; and the notice period to be giving to the community for various blasting related generating activities. o The GRM will be used to record, investigate, and respond to any complaints. Investigation of the complaints will be undertaken by the Supervision Consultant.	Yes			
		♦ Develop a Vibration Monitoring Plan that will include monitoring of vibration levels and frequency around the blasting sites. The objectives of the monitoring will be to: o ensure that vibration levels in the communities are within the adopted criteria levels; o maintain record of vibration to settle any potential conflicts; and o monitor changes in the vibration levels due to possible changes in the rock formation and take appropriate corrective actions.				
7	Blasting may pose a health hazard due to flying debris.	A minimum buffer of 500 m should be provided between the settlements and point of blasting.	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		Leave a layer of about 5 m of undisturbed softs above the top of the overburden blasts. This will act as a blanket to contain air blast, dust and fly rock.	Yes			
		Ensure that the holes are correctly collared with respect to the back-break/inclination of the face and also that digging alongside the initiation face well controlled.	Yes			
		Inadequate forward displacement of the front row burden arising out of the under charging of these holes will result in fly rock from vertical catering of the rear holes	Yes			
		Where fly rock possesses a serious problem, the stemming length should not be less than the whole burden. Also, an effective stemming material like crushed angular rock should be used to prevent premature venting of explosion gases through the stemming column.	Yes			
		The forward fly rock could be fairly controlled to the commonly used 'inline open loop' pattern. The maximum inter-row delay interval consistent with the absence of cut off helped in minimizing the fly rock formation. As a thumb rule an inter-row delay of 4-8ms/m of burden could be used for this purpose.	Yes			
		Adequate care should be taken while connecting the delay devices in the holes/rows and the initiation sequence properly checked before firing to avoid initiation of blast holes out of sequence.	Yes			
		Blasts designed on a face length to width ratio in the range of 3 to 4 produces minimum fly rock.	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
8	Alterations of natural passage of springs due to blasting for tunnels may disrupt the water supply for mountain spring users.	Record location of the springs especially those in areas proximal to where the underground headrace tunnel will be closer to the ground level i.e. high risk areas.		Partial	EPC Contractor submitted Hydro-census Report in the month of November, 2023. The PMC review comments are yet to be addressed by the Contractor.	Final Hydro-census Report submission by January 20, 2024.
		Monitor flow for located springs and maintain records.		Partial	Same as above	Same as above
		Support the community in development of alternate water supply schemes through local NGOs		Partial	Same as above	Same as above
		Ensure the availability of water to the communities and the access of the communities to the water resources being used by them is not adversely affected.	Yes			
9	Use of local water resources for construction activities may reduce the water availability for the local communities.	Develop a Water Sourcing and Abstraction Plan	Yes			
		Source water for construction from authorized abstraction sources agreed between the local communities, local government and EPC contractor.	Yes			
		Water conservation techniques will be developed and implemented by the EPC contractor.	Yes			
		Access of community to water sources shall be kept clear so that the community's ability to meet its water requirements are not compromised.	Yes			
		Exercise care while moving heavy machinery to avoid damage or blockage of natural waterways and channels.	Yes			
		Maintain records of water usage in all Project activities.	Yes			
		Incorporate the above measures in the Construction SSEMP	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
10	Discharge from construction activities can potentially result in the contamination of soil, groundwater and surface water.	Develop and implement a Water Quality Management Plan	Yes			
		Prepare and implement a Spill Prevention and Response Plan and inducted to the staff for any incident of spill.		Partial	There were some incidents of spillages which however, rectified after the PMC instructions.	
		Provide and use spill prevention trays at refueling locations.	Yes			
		The run off from maintenance workshops will be collected by impervious channels and be passed through oil water separators (OWS) before final disposal. The sludge and oil collected at the OWS will be disposed of properly.		No	i. Grease trap is part of the EPC Contractor washing yard. As EPC Contractor has not scheduled washing yard hence, grease trap is also pending. ii. Also, the Contractor has not decided yet, whether to construct washing yard or not.	
		Build separate impervious pits (with concrete walls and proper shed) at the construction sites for temporary handling and storage of contaminated soil and water if encountered during construction such as sludge from OWS.		Partial	The PMC review comments on the sedimentation tank design document have been sent to the EPC Contractor's for updation of the document as the document submitted was deficient of the design parameters considered for design of sedimentation tank.	Revised submission is expected by **January 30, 2024.**
		Keep all fuel storage tanks and lubricating oil drums in secondary containment impervious pits with impervious shed walls.	Yes			
		Avoid on-site maintenance of construction vehicles and equipment, as far as possible.	Yes			
		Regularly inspect construction vehicles and equipment to detect leakages.	Yes			
		Store fuels and lubricants in covered and dyked areas, underlain with impervious lining.	Yes			
		Spill control kits (shovels, plastic bags and absorbent materials) will be available near fuel and oil storage areas, vehicle parking, and	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		vehicle maintenance areas as well as at construction sites.				
		Remove contaminated soil from the site and dispose in a manner to ensure protection of water sources.	Yes			
		Construct the bottom of any soak pit or septic tank at least 100 meters away from springs and water bores.	Yes			
		Maintain records of spills and volume of removed contaminated soil.	Yes			
		Maintain record of remedial measures taken.	Yes			
		Use silt traps to prevent contamination of river and streams.		Partial	The PMC review comments on the sedimentation tank design document have been sent to the EPC Contractor's for updation of the document as the document submitted was deficient of the design parameters considered for design of sedimentation tank.	Revised submission is expected by **January 30, 2024.**
		Incorporate the above measures in the Construction SSEMP	Yes			
11	Increase in ambient noise levels due to operation of construction equipment, movement of construction traffic and blasting may create nuisance for nearby communities and visiting tourists.	Develop a Noise and Vibration Control Plan	Yes[12]			
		Noise generated from construction sites from construction activities. ♦ Select the quietest available plant and equipment that can economically undertake the work required. ♦ Undertake maintenance of the equipment as simple maintenance can reduce noise levels by as much as 50%. Parts may become loose, creating more noise because of improper operation or scraping	Yes[13]			

[12] Noise and Vibration plans are part of the approved SSEMP.
[13] The mitigation measures have largely been implied at sites.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		against other parts. Grinding noises may also occur as the result of inadequate lubrication. • Equipment under use will be regularly maintained, tuned, and provided with mufflers to minimize noise levels. • Use visual alarms in preference to audible alarms. • Enclose noisy equipment. • Provide noise attenuation screens, where appropriate. • Build an enclosure around the noise source so that noise is contained. The enclosure should be free from gaps and made of dense material and be lined with noise-absorbing material like glass or polyester batts. • Locate noisy equipment behind parking lots or parks. • Close liaison with the community and regular monitoring of the noise levels in the community are key to successfully implementation of the above mitigation measures. Specifically, inform communities of all major construction activities three days in advance.				
		Construction noise from traffic • Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site. • Mobile plants such as excavators, front-end loaders and other diesel-engine equipment should be fitted with residential class mufflers and other silencing equipment, as applicable.	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		• Haul roads within the site should have as low a gradient as possible, and paving should be considered if practicable where noise-sensitive receptors are likely to be affected; • Owners and operators of existing facilities should implement special noise reduction measures, such as erecting purpose-built acoustic barriers, restricting opening hours and maintaining transport vehicle				
		Construction noise from on-site plant operations and equipment • All fixed plant at the work sites will be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures. • Modify the equipment or the work area to make it quieter by substituting existing equipment with quieter equipment; retro-fitting existing equipment with damping materials, mufflers, or enclosures; erecting barriers; and maintenance. • Shift to a quieter construction process for example pile driving is very loud as compared to boring which is a much quieter way to do the same work. • Combine noisy operations to occur in the same time period. The total noise level produced will not be significantly greater than the level produced if the operations were performed separately. • All plant and equipment should be regularly maintained. • Move static plant and equipment as far as possible from sensitive boundaries, as	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		work allows. A distance of four times further away lowers the noise by 12 dBA. A reduction of 10 dBA will sound half as loud. ♦ Sound attenuation measures should be used for plant and equipment such as baffles and specialized mufflers, acoustic enclosures or partial enclosure housings. ♦ Acoustic barriers need to be designed and purpose built if needed. Vegetated buffer zones can also be planted to mitigate noise from operations using suitably selected native plantings local to the area. ♦ Reduce workers' exposure to high noise levels by keeping moving workers away from the noise source; restricting access to areas; rotating workers performing noisy tasks; and shutting down noisy equipment when not needed. ♦ Use earplugs to reduce workers' exposure to high noise levels.				
		Noise generated from the blasting in quarry areas. ♦ Using vibratory piling instead of impact piling. ♦ Conveyor belts and crushing/screening equipment can be housed to provide acoustic screening. ♦ It is important that sound-reduction equipment fitted to machinery is used and maintained properly. ♦ Erect earth mounds around the site boundary can provide acoustic as well as visual screening.	Yes[14]			

[14] Construction materials are being supplied from the government approved sources which are located outside of the Project area

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		♦ Soft ground (e.g. grassland and cultivated fields) attenuation can sometimes have a greater impact in reducing noise than barrier attenuation, especially if the ground supports sound absorbing vegetation.				
		Noise emissions from concrete batching ♦ Locate noisy equipment away from potential sources of conflict. ♦ Locate noisy equipment behind sound barriers or sound absorbers – for example, gravel stockpiles or constructed barriers. ♦ Install silencing devices to all pressure operated equipment	Yes			
12	Contamination of soil as a result of accidental release of solvents, oils and lubricants can degrades soil fertility and agricultural productivity.	Prepare a Spill Prevention and Response Plan and induct to the staff for any incident of spill.	Yes[15]			
		Appropriately mark fuel tanks by content and store in dyked areas with an extra 10% of the storage capacity of the fuel tank. The area will be lined with an impervious base.				
		Install grease traps on the site, wherever needed, to prevent flow of oily water.		No	The grease trap is not available	Grease trap will be constructed as part of the washing yard.EPC Contractor has not scheduled construction of Washing yard yet.
		Spill cleaning kit (shovels, plastic bags and absorbent materials) will be available near fuel and oil storage areas.	Yes			
		Carry cleanup kits in all fuel trucks.	Yes			
		Fueling should only take place over impermeable surfaces, other hazmat should	Yes			

[15] The requisite plan is included in the approved SSEMP.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		be stored and used over impermeable surfaces.				
		The bottom of any soak pit or septic tank shall be at least 10 m above the groundwater table. The distance can be reduced, based on the soil properties, if it is established that distance will not result in contamination of groundwater.	Yes			
13	Land clearing, excavation, tunnel boring and other construction activities may loosen the top soil in the Project area resulting in loss of soil and possible acceleration of soil erosion and land sliding, especially in the wet season.	Develop an Erosion Control Plan.	Yes			
		Limit vegetation loss to demarcated construction area.	Yes			
		Cover areas such as muck disposal area, batching plant, labor camp and quarry sites after the closure shall with grass and shrubs.		No[16]		
		Adopt slope stabilization measures such as adequate vertical and horizontal drains, drainage along roadsides, cross drainage and retaining walls.	Yes			
		Monitor slope movements around excavation work areas.	Yes			
		Salvage, store, and reuse all topsoil at all construction sites.	Yes[17]			
		The height of the stockpile will be minimized to the extent possible by increasing the size of the land for the stockpile.	Yes			
		Topsoil will be carefully stripped to ensure that it is not mixed with subsoil.	Yes			
		The stockpiles will be revegetated to minimize loss of soil quality, minimizing weed infestation, maintaining soil organic matter levels, maintaining soil structure and microbial activity.	Yes			

[16] The closure phase has not been reached yet.
[17] As most of the temporary facilities have either been identified on the barren land or on mountainous land hence, this and the subsequent mitigation measures are so-far not applicable. The compliance status of these mitigation measures has however been termed “Yes” exhibiting such measures have indirectly been complied.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		Topsoil stockpiles will be clearly signposted for easy identification and to avoid any inadvertent losses.	Yes			
		The establishment of declared plants on the stockpiles will also be monitored and control programs implemented as required.	Yes			
		The topsoil will be treated with temporary soil stabilization and erosion control measures.	Yes			
		During removal of topsoil stockpile for restoration of project affected areas, it is preferred that the soil is removed in layers (less than 0.5 m thick) under a gradual process.	Yes			
		The top layer will be mixed with the remainder of the stockpile to ensure that living organisms are distributed throughout the topsoil material at the time of final placement. The use of micro-organism inoculates may be necessary to re-establish micro-organisms in topsoil material.	Yes			
		Select local species for plantation to restore the biodiversity of the area in consultation with Forest Department after completion of respective activities.	Yes			
14	Failure of spoil dumping sites resulting in increased erosion and sediment load entering river	Dumping sites should have a flood prevention design for a 20-year flood.	Yes			
		The water drainage works consist of the masonry structures, and shall be designed to drain a 5-year rainfall every 10 minutes.	Yes			
		Where constructed tailing hold structure will be of galvanized woven wire mesh gabions	Yes			
		All dumping sites will undergo vegetation restoration works comprising of surface	Yes[18]			

[18] All dumping sites will be rehabilitated under the terms of lease agreements while, where applicable, plantation will be undertaken on the dumping sites.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		leveling, covering and forest/grass planting or agricultural land rehabilitation				
		Develop a Spoil Disposal Plan that includes the following measures: • Slope movements will be monitored around excavation work areas. • Restore to the maximum extent possible the hydrological regime and reinstate natural drainage of the land (including provisions to maintain the water balance of the site and protect from flooding where appropriate). • Reinstate topsoil (in case it was stripped before construction activities). • Revegetate sites with suitable native plant species. • Drain spoil piles to prevent the concentration of flow and to prevent rill and gully erosion. • Separate organic material (e.g., roots, stumps) from the dirt fill and store separately. Place this material in long-term, upland storage sites, as it cannot be used for fill. • Store “clean” material in a short-term disposal site (stockpile) if it will likely be re-used for fill or shoulder widening projects. • Where feasible, recycle asphalt material in embankments and shoulder backing. Place these materials where they will not enter the stream system. Asphalt that is 5 years old is considered “inert” (that is, all oils washed off).	Yes[19]			

[19] Spoil disposal plan is included in the approved SSEMP.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		• Do not add excess unusable material to permanently closed sites. • Spread material not to be re-used in compacted layers, generally conforming to the local topography. • Design the final disposal site reclamation topography to minimize the discharge of concentrated surface water and sediment off the site and into nearby watercourses. • Cover the compacted surfaces with a 6-inch layer of organic or fine-grained soil, if feasible. • After placement of the soil layer, track walk the slopes perpendicular to the contour to stabilize the soil until vegetation is established. Track walking creates indentations that trap seed and decrease erosion of the reclaimed surfaces. (See figure on next page.). • Revegetate the disposal site with a mix of native plant species. Cover the seeded and planted areas with straw compost, mulched with straw at a rate of 1 to 1 ½ tons per acre. Apply jute netting or similar erosion control fabric on slopes greater than 1:2 if site is erosive. • Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion. • Ensure that stockpiles and batters are designed with slopes no greater than 1:2 (vertical\ horizontal). • Besides these measures, erosion can also be minimized by regular rehabilitation of areas not in use for Project activities during				

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		construction. These will include: Re-grading and immediate re-vegetation (using fast-growing species and different functional groups of plants for keeping soil in place) of slopes to minimize erosion. • Install erosion and sediment control measures, if possible before construction commences. · Identify drainage lines and install control measures to handle predicted storm-water and sediment loads generated in the mini-catchment. • Design and install appropriate erosion and sediment run-off control measures appropriate to site conditions to handle a one-in-two-year storm event (two-year ARI with intensity of six hours), for temporary structures, and a one-in-fifty year storm event, for permanent structures. • Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. Ensure that contingency plans are in place for unusual storm events. • Continually assess the effectiveness of sediment control measures and make necessary improvements. • Keep temporary disposal sites out of wetlands, adjacent riparian corridors, and ordinary high-water areas as well as high risk zones, such as 100-year floodplain and unstable slopes. • Anticipate sufficient storage area with no risk for sediment delivery for piles that may slump. Stress cracks indicate that the pile is at risk of slumping.				

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		• Cover the trucks that will be used for the transportation of spoil material to disposal sites.				
15	Deterioration of aesthetics and visual amenity of nearby receptors due to construction activities, including vehicular movement on roads, may cause disturbance in aesthetics for tourists, businesses and nearby communities.	Minimize disturbance to, or movement of, soil and vegetation.	Yes			
		Back fill to original levels.		No	Mitigation measures will be applied upon completion of activities at site(s).	
		Reshaping to match in with surrounding topography.	Yes			
		Reinstate vegetation around construction sites.		No	Implementation of tree plantation plan has not been started yet.	As per tree plantation plan schedule, implementation of tree plantation will be initiated in the first quarter of 2024.
16	Permanent impact in aesthetics due to proposed developments.	Develop and implement a Site Rehabilitation and Landscaping Plan.	Yes			
		Use colors that better integrate with the landscape.	Yes			
		Disguise elements with vegetation where possible.	Yes			
		Retain as much natural vegetation as possible.	Yes			
17	Increase in congestion, due to increased traffic volume will cause delays.	Develop and implement a Traffic Management Plan.	Yes			
		Make roundabouts for the congestion points.	Yes			
		Retain as much natural vegetation as possible to reduce the impact of smoke due to vehicles.	Yes			
		The vehicles going on the spoil routes and passing through the communities must be completely covered to avoid dust emissions.		Partial	Vehicles loaded with construction materials are generally covered however, some of the vehicles were observed without cover	EPC Contractor has been instructed to immediately cover materials loaded on transportation vehicles.

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
					hence, the aspect termed as partial.	
		Strictly implement speed limits and defensive driving policies.				
18	Increase in traffic volume will deteriorate the air quality.	Keep speeds slow (30 km/hr) on unsealed roads.	Yes			
		Sprinkle water on unsealed roads that are used for construction traffic.	Yes			
		Retain as much natural vegetation as possible to reduce the impact of smoke due to vehicles.	Yes			
		The vehicles going on the spoil routes and passing through the communities must be completely covered to avoid dust emissions.		Partial	Same as above.	
		Strictly implement speed limits and defensive driving policies.	Yes			
		Promptly and properly repair and maintain roads that are subject to damage by Project activities.	Yes			
19	Increased risk to community safety due to increased traffic volume during the construction phase near communities.	Develop and implement a Traffic Management Plan.	Yes			
		Identify suitable times to transport equipment.	Yes[20]			
		Road safety awareness education will also be included during community visits or information sessions, so that communities can be familiarized with common road signs and the types of vehicles and equipment that will be moving through the area	Yes			
		Keep speeds slow (30 km/hr) where there is traffic exchange between roads.	Yes			
		Make roundabouts for the congestion points.	Yes			

[20] Only day time transportation is undertaken

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		Designate traffic wardens at roads on the transport route to manage traffic during school hours.	Yes			
		Construction traffic will not travel during school starting and ending hours on designated road segments in front of schools on the transport route.	Yes			
		Strictly implement speed limits and defensive driving policies.				
		Maintain vehicles especially brakes.				
20	Degradation of the pavement due to use by heavy construction traffic	Promptly and properly repair and maintain roads that are subject to damage by Project activities.				
21	Direct, indirect and induced employment at the local levels, resulting in increased prosperity and wellbeing due to higher and stable incomes of people.	**Enhancement measures**: • ensure preferential recruitment of local candidates provided they have the required skills and qualifications. • include an assessment of the contractor's demonstrated commitment to domestic and local procurement and local hiring in the tender evaluation process. • coordinate recruitment efforts related to non-skilled labor, including for non-skilled labor positions required by contractors.	Yes			
		Good practice measures: • determine what is considered to be 'fair and transparent' in recruitment and in distribution of jobs between different community groups, in consultation with local communities and their leaders.	Yes			
22	Increase in the stock of skilled human capital due to transfer of knowledge and skill under the Project resulting in enhanced	Support a 'Vocational Training Program' to assist local people to qualify for semi-skilled positions focusing on issues such as procurement, involvement of vulnerable groups in Project opportunities and continual professional development of staff.		Partial	Vocational training institute and potential candidates for the trainings have been identified however, admission in the institute is still pending at the EPC Contractor's end.	Admission are expected to commence in the first quarter of 2024. As EPC Contractor failed to achieve two milestones set in 2023, hence, the

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
	productivity of the local labor.					equivalent amount on prorate basis will be deducted from the Contract Cost under Item No. 5 “Environmental Mitigation Cost” of Schedule 4 of the EPC Contract.
		Assist local people having practical skills but lacking qualifications to obtain their certificates and thus increase their employment opportunities.	Yes			
		Support initiatives promoting a culture of learning in local communities.	Yes			
		Plan and implement training program for vulnerable groups to encourage their participation in economic opportunities created by the Project.	Yes			
		Assist employees and local communities to improve basic personal financial life skills through training and awareness campaigns, respectively.				
		Consider further training programs to prepare retrenched workers to seek employment in sectors not related to dam construction.	Yes			
23	Increase in recreational and subsistence fishing due to increase in catch of fish following creation of favorable habitats for the fish in the Kunhar River.	Implementation of the BAP		Partial	• The works related measures have been taken by the EPC Contractor while for the protection measures in the Area of Management, focal persons have been notified by both the departments while field office for fisheries department has been identified. The SDFO (Wildlife) Balakot office has been	Signing of contract and field activities will be initiated after grant of the Bank concurrence to the updated EIA report.(See Corrective Action Plan)

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
					proposed for the Wildlife protection activities. • EIA report has been updated to reflect changes in the BAP implementation arrangement and BAP Management Committee composition.	
24	Loss of income from sand and gravel mining due to change in pattern of sediment deposition following construction of the dam.	Sediment Mining and Management Guidelines are prepared and will be implemented as a part of the BAP, which will identify possible sand and gravel mining spots along the Kunhar River to meet community needs without harming the river ecology.	Yes			
25	Increase in population due to in-migration of job seekers (in-migrants) leading to pressure on existing social infrastructure and services in the Study Area.	Development of a Grievance Redressal Mechanism	Yes			
		Encourage local communities to use the grievance procedure for concerns related to deterioration of local services.	Yes			
		Support local government in the implementation of infrastructure projects.	Yes			
		Support NGOs specializing in development of infrastructure to assist local government.	Yes			
26	Disputes over distribution of Project employment within and between Study Area inhabitants and the in-migrants resulting in social unrest.	Implement PEDO Stakeholder Engagement Plan including: ♦ maintaining regular communication with local communities and other stakeholders to minimize tensions arising from Project activities; ♦ maintaining a grievance procedure, and encourage and facilitate stakeholders to use the mechanism to express concerns; and ♦ providing sufficient resources to the community relations officers to enable them to monitor negative perceptions and	Yes			

S/No	EMP Requirements		Compliance Attained		Comment on Reasons for Partial or Non-Compliance	Required Action and Target Dates to Achieve Compliance
	Impact	Mitigation Measures				
		associated tensions, and to address them in a timely fashion.				
27	Potential social unrest in the Study Area due to conflicting socio-cultural norms amongst the inhabitants and in-migrants.	Plaster the graves with mud or cement.		No	The affected community and the district administration have not yet decided whether to shift the graves or not or when to shift the graves. In this regard, a committee has been notified (notification attached as **Annexure-06)** comprising of community representatives, representatives from district administration and the Balakot HPP (300 MW), with the mandate to resolve the matter align with religious and local acceptable norms.	
		If relocation of the graveyard cannot be avoided, it shall be managed through the local religious authorities.	Yes			

5.7 Trainings

172. **Annual OHS training.** Pursuant to the EMP/SSEMP requirements, the EPC Contractor arranged the Annual OHS training on August 8 and 09, 2023 at the Project Site. The two-ay training was imparted by professionals of the Rescue 1122 of District Mansehra. The training was participated by relevant staff from PIU, PMC and the EPC Contractor's HSE staff and supervisors from the work sites, workshop and batching plant, etc.

173. On the first day of the training, the Rescue 1122 professionals presented various aspects of OHS, including risks at work site, emergency response, and first aid administration. At the end of the presentation, fire extinguishing drills and training on first aid administration were also held at the Adit-02 camp.

174. On the second day of the OHS training, field demonstrations were held at Adit-02, and workshop and batching plant sites wherein drills were undertaken involving emergency response, evacuation and first aid treatment in case of occurrence of incident(s).

175. At the end of the training, certificates were distributed among the participants.

176. **Training on HSE report writing.** To help and support the EPC Contractor in preping HSE periodic reports, the PMC EE trained the EPC Contractor's HSE team on August 7, 2023 at Adit-02 Camp. During the session, the EE of PMC apprised participants about requirements of the HSE periodic reports, its structure and other various essentials.

EPC Contractor's HSE Team Training on Report Writing

5.8 Complaints

177. The Divisional Forest Officer (DFO), Kunhar Watershed Division Mansehra's complaint regarding damages to the trees at access road R-03 was handled jointly by the PIU, PMC, and EPC Contractor. Several meetings among the stakeholders were held, while the DFO visited the Site on June 24, 2023.

178. As a result of the above, the DFO withdrew his complaint, and requested the PD Balakot HPP (300 MW) to direct the GRC, JV partner of the EPC Contractor, to take all precautionary measures to avoid damages to the plantation under the Billion Tree Tsunami drive. The DFO's letter to the PD is in **Annexure-07**.

179. **Table 5.10** exhibits details of the complaint and its current status.

Table 5.10: Details of DFO's Complaint Received during the Reporting Period

Details of Complaint	Complainant*	Received			Actions (to be) taken with the target date	Resolution Status***
		Through*	By whom**	Date		
Damage to the Plantation Site: Damages to the trees falling in the Access Road R-03 caused by the EPC Contractor's earthworks	DFO, Kunhar Watershed Division, Mansehra.	Letter	PIU	January 18, 2023	As described under paras 177 and 178	Resolved

*Resident, NGO (nongovernmental organization) etc.
**Verbally, letter, complaint box, email, etc.
***EP Contractor, PMC or PEDO/Energy and Power Department, Government of KP
****Open or closed (if closed, include date)

6 FUNCTIONING OF THE SSEMP

6.1 SSEMP Review

180. Generally, the SSEMP serve the intended purpose of mitigating/minimizing risks associated with the construction activities.

181. Various plans contained in the SSEMP, like the Erosion and Sediment Control Plan, Pollution Prevention Plan, Waste Management Plan, Instrumental Environmental Monitoring Plan, and Health and Safety Plan were satisfactorily implemented by the EPC Contractor. During the reporting period, the Blasting Management and Tree Plantation plans in the SSEMP were updated, made more Site-specific, and furnished as standalone documents. These documents will be submitted to the PIU on or before January 14, 2024 for review and onward transmission to the ADB.

182. Although there were instances of minor non-compliances at Adit-02 and access road R-03 sites, by and large, the EPC Contractor complied with the SSEMP provisions regarding health and safety aspects of the Project. The minor non-compliances observed include issues in storage of materials; safe disposal of effluent from adit tunnels; generation of dust due to the Project vehicles' movement on unpaved access roads, particularly at R-03; lack of exhaust emission monitoring equipment in adit tunnels; and the EPC Contractor's delayed submission of periodic reports. These minor non-compliances were largely rectified through persistent follow-ups,regular meetings with the EPC Contractor's HSE staff; induction trainings; annual OHS training; and regular toolbox talks, and other trainings for the EPC Contractor's workforce.

183. Non-initiation of Vocational training and hiring of full-time PMDC register doctor for the medical dispensary at the camp are the two major non-compliances which the EPC Contractor failed to rectify during the reporting period. However, the EPC Contractor committed to comply in January 2024.

184. Although there was no need to revise or amend the approved SSEMP, as stated above, the Blasting Management and Tree Plantation plans in the SSEMP were updated as standalone documents. As the SSEMP is construed to be a live document, when the need arises, the same will be updated as per site conditions, and intimated to ADB/AIIB.

7 GOOD PRACTICE AND OPPORTUNITY FOR IMPROVEMENT

7.1 Good Practice

185. The EPC Contractor's consultation with the local area community, and provision of jobs for them created a good working environment at Site. As exhibited under **Figure 2.10,** more than 50% of the EPC Contractor's workforce come from the Project area. This is very essential for smooth execution of works at Site, and elimination of unwarranted stoppages by the affected community.

186. To preserve the local norms and cultural values, the EPC Contractor provided veils (green shade nets) to the houses in the immediate vicinity of the work area. As evident from the picture below, the EPC Contractor also installed such veils along the access roads and other appropriate locations. This initiative of the EPC Contractor created a sense of norms protection in the community resulting in conducive relations.

Green Shade Net at Residential Colony Site

187. The EPC Contractor regularly held monthly HSE champion events whereby prizes are distributed among labors (skilled/unskilled) who demonstrated proven adherence to the worksite safety protocols. This initiative is indeed a commendable practice to promote a safe environment at the worksite. It recognizes and empowers individuals within the workforce who displayed exceptional commitment and dedication to HSE practices. By establishing HSE champions, the organization encourages a culture of safety, and empowers employees to take an active role in identifying and addressing potential hazards or risks. These champions serve as role models and ambassadors for safety, promoting best practices, conducting safety inspections, and fostering a collaborative approach to mitigate risks. The HSE Champion Program fosters increased awareness, engagement, and accountability among the workforce, leading to a safer work environment, reduced accidents, and improved overall well-being.

188. Although limited open spaces are available in the camps, the EPC Contractor arranged sports and other recreational activities. For example, at Adit-02 camp, the EPC Contractor provided A basketball facility where basketball matches were regularly held at evening time. Such an activity is beneficial for a healthy life, and utilizing spare time.

7.2 Opportunities for Improvement

189. Although the EPC Contractor created good working relations with the community through providing jobs and skilled development trainings, there is room for improvement in cementing such relations. This can be achieved through regular communication, addressing

community concerns, and implemening social responsibility initiatives. For example, at the dam site, the EPC Contractor's regular interaction has its own significance in subsidizing the social aggrieved sentiments, though intensity of such issues has largely been reduced during the last three months of the reporting period.

190. Although the PMC staff provided training to the EPC Contractor's HSE team, concentrated efforts are needed to improve the quality of periodic reports.

8 SUMMARY AND RECOMMENDATIONS

8.1 Summary

191. During the reporting period, construction activities at the residential colony, access roads, adit tunnels, batching plants and camps/workshops remained in progress. Dedicated staff from PMC and PIU regularly supervised and monitored the HSE aspects of these activities.

192. As evident from subhead 3.3, most of the non-compliances reported during the last SAEMR have largely been rectified during the current reporting period. Due to consistent efforts of the Project HSE team, regular capacity building/orientation trainings, incentives given under the HSE champion program, and fines imposed on HSE provisions violators, non-compliances have significantly been reduced during the current reporting period.

193. As expounded in the preceding paras, non-initiation of vocational training and hiring of full-time PMDC register doctor for the medical dispensary at the camp are the two major non-compliances which the EPC Contractor failed to rectify during the reporting period.

194. Owing to the complexity of the Basin-wide BAP initiative, consultations with key stakeholders and prospective financers continued with the aim to achieve a common ground, identify challenges, and pave the way forward to ensure smooth and early materialization of the Basin-wide BAP as envisioned in the EIA report.

195. The Project-specific BAP in the Area of Management is at the advance stage of finalization as focal persons, and field office for fisheries interventions have been identified. Contract signing with the departments (Fisheries and Wildlife departments of the government of KP) will be initiated upon ADB/AIIB's concurrence to the updated EIA report which is scheduled to be submitted on or before January 15, 2024.

196. Alongside other technical reports, the EPC Contractor submitted quarterly and monthly HSE progress reports, though such submission remained delayed due to reasons attributed to the EPC Contractor.

197. Instrumental environmental monitoring was held at Site in a timely manner, at the points pinned in the SSEMP. Except for a few exceedances in particulate matters and noise levels mainly associated with the earthwork activities, the results obtained were generally consistent with the baseline results.

198. **Table 8.1** exhibits the status of implementing the targets set in the previous SAEMR during the current reporting period.

Table 8.1: Implementation Status of Corrective Action(s) Proposed in the Previous SAEMR

S/No	Issue	Required Action	Responsibility	Timing (Target Date)	Description of Resolution and Timing (Actual)	Reason(s) of delay/non-achievement and further Action Required with Time frame
1	Pending signing of BAP contract with Fisheries and Wildlife departments	Finalize various modalities, e.g. offices, human resources, payment modalities, in consultation with the Fisheries and Wildlife Departments of the government of KP.	PIU- Balakot HPP (300 MW)	October 15, 2023	In progress	i. Delay was primarily attributed to updating EIA, its review and concurrence by ADB. ii. During the ADB safeguard review mission on September 18, 2023, it was agreed that the updated EIA will be submitted upon ADB's concurrence to the Basin-wide BAP Second Consultation report to reflect agreed changes, if any.[21] iii. EIA will be submitted on or before **January 15, 2024**, while Project-specific BAP contract will be signed within two months of the EIA's concurrence or till April 30, 2024, whichever comes first.
2	Missing record of springs identified in the headrace tunnel alignment which may potentially be affected by the underground excavation work.	Identify springs/underground water sources along the headrace tunnel/underground works.	EPC Contractor	August 15, 2023	In progress	i. The EPC Contractor submitted a hydro-census Report in November 2023. ii. The PMC communicated comments, while updated submission is targeted on **January 25, 2024.**
3	Pending approval of muck disposal sites	Submit method statements for review and approval containing muck disposal sites' details	EPC Contractor	September 15, 2023	In progress	i. In response to the EPC Contractor's report containing sites identified for muck disposal, the PMC EE undertook due diligence of the identified sites in September 2023. Consequently, only 1 out of the 10 identified sites was found suitable subject to construction of protection and drainage works. The rest were either found unfeasible or required costly access and huge protection works. The EPC Contractor will submit the revised report, containing new sites and responses to the PMC for review on or before **January 25, 2024.**
4	Pending NOCs for solid waste disposal, including medical	Follow up applications submitted for NOCs.	EPC Contractor	July 20, 2023.	August 11, 2023	i. KDA issued NOC for solid waste disposal on August 11, 2023. ii. NOC for the medical waste disposal is still pending

[21] For further details, refer to subhead 3.1.6

S/No	Issue	Required Action	Responsibility	Timing (Target Date)	Description of Resolution and Timing (Actual)	Reason(s) of delay/non-achievement and further Action Required with Time frame
	waste					with the relevant quarters at District Headquarter Hospital Mansehra. iii. With the assistance of PIU, the requisite NOC is expected to be obtained by **January 30, 2024.**
5	Pending Tree Plantation Plan	Submit Tree Plantation Plan with the consent of relevant quarters at the Forest Department	EPC Contractor	October 30, 2023.	December 11, 2023	i. Although the EPC Contractor submitted the Tree Plantation Plan within the target date, it was deficient in details. The revised plan was submitted on December 11, 2023, which remained under the PMC review during the reporting period. ii. Tree Plantation Plan will be submitted to PIU on or before **January 14, 2024**.
6	Non-availability of spill kits	Provide spill kits	EPC Contractor	July 31, 2023	December 15, 2023	Although the EPC Contractor supplied spill kits within the target date, the quality was not good and hence rejected. New spill kits were subsequently provided in December 2023.
7	Nonprovision of earplugs to the work force at machinery operation sites.	Provide earplugs and other essential equipment	EPC Contractor	July 28, 2023	July 25, 2023	Closed.
8	Non-availability of grease trap	Provide grease traps where needed as part of the washing yard.	EPC Contractor	August 30, 2023	--	i. Grease trap is part of the EPC Contractor's washing yard. ii. As the EPC Contractor has not decided yet on whether to construct washing yard or not, the grease trap is pending.

199. The Corrective Action Plan in **Table 8.2** shows pending issues from the previous monitoring period and those identified during the current monitoring period.

Table 8.2: Corrective Action Plan against issues identified during the Previous and Current Monitoring Periods

S/ No	Issue	Required Action	Responsibility	Timing (Target Dates)
Pending Issues from the Previous Report(s)				
	Pending signing of BAP contract with Fisheries and Wildlife departments	i. Submit the updated EIA report to ADB/AIIB reflecting changes in the Project-specific BAP and design (Dam site). ii. Finalize various modalities, e.g. offices, human resources, and payment modalities, in consultation with the Fisheries and Wildlife Departments of the government of KP.	PIU	April 30, 2024
Issues Identified during the Current Monitoring Period				
1	Pending establishment of fully equipped dispensary under the full-time charge of the PMDC registered medical doctor	Hire full-time PMDC-registered medical doctor	EPC Contractor	January 30, 2024
2	Pending vocational training for community	i. Finalize list containing eligible candidates from the affected community. ii. Secure admission to the identified government-approved institute.	EPC Contractor	January 30, 2024
3	Pending NOCs for medical waste	Follow up the applications submitted for NOC.	EPC Contractor with the assistance of PIU	January 30, 2024
4	Depending disposal of A-02 camp kitchen effluent	Construct filter/treatment facility	EPC Contractor	February 15, 2024
5	Pending submission of i. Updated EIA report ii. Tree Plantation Plan iii. Blasting Management Plan	Submit plans to ADB for review and concurrence	PIU)	January 15, 2024.
6	Pending second Basin-wide BAP Consultation Report	Prepare the 2nd Basin-wide BAP Consultation Report containing details of the consultation(s) carried out with the stakeholders, and recommended course of action(s).	PIU and PMC	January 30, 2024

8.2 Recommendations

200. As recommended in the virtual consultation meeting with the prospective financiers of the Basin-wide BAP on November 14 & 17, 2023, the proposed larger joint consultation meeting with the stakeholders should be held at the earliest to finalize future course of action.

201. Subsequent to ADB and AIIB's concurrence to the updated EIA report, concentrated efforts will be needed on the part of stakeholders to enable PEDO to sign contract(s) with the Fisheries and Wildlife departments of the government of K P as field activities cannot be initiated unless the contracts are signed.

ANNEXURES

Annexure-01: Minutes of HSE Weekly Progress Review Meeting (December 29, 2023)

Balakot Hydropower Project (300 MW)

Minutes of HSE Weekly Progress Review Meeting

Dated December 29, 2023

S.No	Agenda Item	Action	Responsibility	Time Frame
1.	i. Discussed major non conformances and their effective resolution. ii. Kitchen waste water directly dump in to the Nullah. And Patsaani mess waste effluent was not connected with the main sewer line. iii. DRC and Sub Contractor workers do not have PPEs.	i. Contractor, PMC and PEDO decided to rectify the non-conformance right on time and in the weekly progress meeting all stakeholders will review the HSE progress of the contractor. ii. Kitchen sewage should be connected with the main sewer line and construct Sand filter before dumping kitchen effluent. iii. Contractor is responsible for providing the PPEs of their own and sub-contractor's workers.	EPC Contractor	i. Target date 12th Jan., 2024. ii. Kitchen sewage disposal 31st August 23 (Issue Pending) New Date: 31st Jan, 2024 iii. PPEs 10th Jan. 2024
2.	Site orientation video translation in Urdu and English.	PMC instructed to the Contractor to translate the Video in English and Urdu language. EPC contractor agreed to translate the video in both languages.	EPC Contractor	Target date will be 10th November, 2023. (Issue Pending)
3.	Current status of vocational and HSE trainings.	i. PMC advised the contractor to submit the schedule of HSE trainings or training matrix. ii. PIU Social team have sent the approved list of the participants to the EPC contractor. iii. But contractor delay the admission time of the institute. iv. DD, PEDO have instructed to the contractor to avail the next coming admission date and update the PMC and PEDO. v. PMC will write a letter on delay in admission process for vocational training.	EPC Contractor with the assistance of PIU/PMC social team	Training matrix till 24th, November, 2023. (Issue Pending). Vocational training will be in the month of November as per institute's schedule. (Issue Pending). Letter 1st, Jan, 2024.
4.	Marking operation Clearly mention the disposal site for muck disposal	EPC contractor have submitted their proposal for muck disposal area but PMC asked for few more information about the muck disposal area before approval. EPC Contractor will re-submit the list. PMC has made plan to conduct joint visit to the proposed muck disposal areas with PEDO and EPC Contractor.	EPC	October,10th 2023 (Issue Pending) Joint visit with EPC, PMC, PEDO, December, 28th, 2023. New Date: 2nd Jan, 2024.
5.	Establish the emergency protocol.	Emergency evacuation drill should be conducted. Contractor will invite the PMC and PEDO to monitor the performance of the evacuation drill. PMC instructed to the contractor to conduct evacuation drill before the end of Dec. Contractor has requested to PMC for giving them more time to scheduling the evacuation drill more betterly.	EPC Contractor	Worst scale: October, 2023. (Issue Pending) Evacuation Drill: 4th, Jan, 24

S.No	Agenda Item	Action	Responsibility	Time Frame
6.	Electrician final incident investigation report submission Watchman accident initial report.	EPC contractor requested for more time to investigate the incident. PMC urge on timely reporting of the incident. PMC asked to the contractor about the delay in submission of written initial investigation report of the watchman. EPC contractor informed that the incident was occurred outside the site. PMC urge to submit the initial report then PMC will investigate it.	EPC Contractor	Final Incident Report December, 28th , 23 (Issue Pending) Final and initial reports of both incidents respectively. New Date December, 30th , 23
7.	HSE coverage on site.	PMC urged the DPM for increasing the HSF manpower on site for swift rectification of HSE issues. CGGC hired new HSE officers two Chinese and two Pakistani. PMC asked to hire two more HSE officers for the night shift.	EPC Contractor	26th, October, 2023 (Issue Closed)
8.	EPC mostly absent in the HSE progress review meetings.	PMC take the action against the EPC casual attitude toward HSE meetings and its procedural implementation. PMC decided to write a letter on GRC strenuous attitude toward HSE.	PMC	Letter: 1st, Jan, 24
9.	CV of the Doctor has submitted to the PMC but not proceed further for hiring process.	Permanently engage PNDC certified Doctor and fully equipped the Clinic. Contractor now searching for the doctor again after the change management. Contractor informed that they purchase all the required equipment and beds for the clinic. PMC will visit the clinic to verify the contractor information.	EPC Contractor	Equipment: 18th November, 23 (Issue Closed) Letter for the Doctor: 1st Jan 24
10.	EPC workers were found improper PPEs and lose clothing.	Instructed to the concerned for effective implementation of the PPEs on site. PMC will write the letter on the violation of PPEs non-compliance. PMC asked to the CGGC for taking action against GRC.	EPC Contractor	10th November, 23 (Issue Pending) Take action against GRC: 1st, Jan, 24
11.	Empty First aid boxes on the site.	HSE team will check all the first aid boxes and refilling the required items. CGGC complied but GRC not took any action.	EPC Contractor	GRC: 15th, Jan, 23
12.	Permit to work procedure is not implement on the site.	Apply the PTW procedure on the site and all high-risk jobs should perform under the permit to work procedure. EPC contractor said that the PTW procedure implementation will be difficult. PMC and PEDO emphasize to apply PTW procedure. Contractor has agreed to implement the PTW procedure.	EPC Contractor	15th, Jan, 24
13.	Condition of the workers camp is not up to the standard.	DG, PEDO informed the EPC contractor that the PMC and PEDO will conduct the visit of the workers camp in the month of November. EPC contractor respond that the Camp under construction when it will complete the issue will be rectified.	EPC Contractor	28th, Feb, 24

S.No	Agenda Item	Action	Responsibility	Time Frame
14.	Bad light in the night time on all Adits.	PMC instructed to the EPC contractor to arrange the proper light system on the access routes and in the tunnels for executing safe work. PMC showed the pictures of night shift activities and urge the contractor for conducting the lux survey of the site. Contractor responds that they already rectified the issue. H&S Expert said that he will himself verified the lighting issue in the night time before removing the issue from minutes of the meeting.	EPC Contractor	26th, December, 23 Issue Closed
15.	Access road of the Adit-1 & 2 was muddy and slippery due to the water accumulation.	PMC instructed to the contractor for the rectification of the issue without any delay. EPC contractor respond that the issue has been resolved right after the complaint raised by PMC H&S expert. PMC instructed to the contractor to establish the car washing area at riverbed in the ESMP, to stop the car washing on the road. Construct and manage the drain system in the tunnels. EPC contractor informed the PMC that car wash is constructed and the drain system is in working.	EPC Contractor	Car washing area: 15th, Jan, 2024 Issue Closed Drain System: 15th, Jan, 2024 Issue Closed Installation of grease and oil trap: 28th, Feb 2024.
16.	Availability of Lux Meter, Gas test meter, DB(A) Meter	PMC and PEDO instructed to conduct gas test, lux survey, sound intensity measurement	EPC Contractor	31st, Jan, 2024.
17.	Segregation of the PPE and Non-PPE Area	PMC instructed to the EPC contractor to conduct risk assessment and establish the non-PPE area and install the signage on the site.	EPC Contractor	31st, Jan, 2024.
18.	HSE Inhouse training sessions.	PMC instructed to Mr. Babar and Mr. Irshad for conduction HSE in house training session.	EPC Contractor	31st, Jan, 2024
19.	Pakistani Workers Mess condition and shortage of facilities	PMC and PEDO urge to the contractor to stop the discrimination between the Pakistani and Chinese workers' mess. Provide proper temperature maintenance device, refrigerator, chairs and tables etc. in the Pakistani mess.	EPC Contractor	31st, Jan, 2024
20.	Winter contingency plan requirement	PEDO instructed Contractor for the preparation and submission of the winter contingency plan without any delay. PCDO asked PMC for writing a letter to the contractor on the winter contingency plan submission.	EPC Contractor & PMC	Letter: 28th Dec, 23 Issue Closed Contingency Plan: 15th, Jan, 24.
21.	Hiring of HSE professionals. Depute housekeeping staff on each Adit.	On site all round two in the day time and one in the night for each Adit. Depute two housekeeping staff on each Adit.	EPC Contractor	31st, Jan, 2024 Issue Closed

S.No	Agenda Item	Action	Responsibility	Time Frame
33.	Installation of flash light and reverse alarm on all heavy vehicles.	PMC instructed to the contractor for conducting plan preventive maintenance of all vehicle and rectify the all issue mention on the vehicle checklist. Urgently arrange the flash light and reverse alarm for all heavy vehicles. EPC contractor informed that the issue has been resolved.	EPC Contractor	31st Jan, 2024 Issue Closed
33.	Washroom condition in Adit-3	PMC instructed to the Contractor for the maintenance of washrooms in the Adit-3 and provide more Cleaner.	EPC Contractor	31st, Jan, 2024
34.	Barriers and signage on all the high-risk jobs.	PMC instruct the contractor for the performing all high-risk jobs under barrier and install signage for the awareness of the other worker. Housekeeping workers should utilize for this said activity.	EPC Contractor	15th, Jan, 2024
35.	Confined Space format need to update.	PMC appreciate the efforts of Mr. Ajmal for effective implementation of the confined entry log sheet at Adit-3. PMC instructed to Mr. Babar for updating the confined space entry log sheet. At the time of entry and exit person need to sign the log sheet twice.	EPC Contractor	15th, Jan, 2024
36.	Lack of HSE coverage by GRC.	GRC do not have HSE manager and officers in their organization as mention in the Method statement. PMC constantly instructed to the contractor but still no progress on the issue and site activities were going on without HSE coverage. PMC decided to stop the activities of the EPC Contractor for the safety of the workers.	EPC Contractor	5th, Jan, 2024

Enclosed: Pictures and Attendance Sheet

Pictures of HSE Weekly Progress Review Meeting

BALAKOT HPP CONSULTANTS

A JV of DOLSAR, ACES, BAK, CN TECH, ELECTRA & TLC Consultants

LIST OF PARTICIPANTS

WEEKLY HSE PROGRESS REVIEW MEETING AT ADIT-2,
BALAKOT HYDRO POWER PROJECT
HELD ON
(DECEMBER,29, 2023)

Chaired by: Syed Ali Fawad Shah

Sr.#	Name of Participants	Designation	Department/ Organization	Signature
1.	Qiming/ong	PPM (BOWF)	CGGC	
2.	Wang Zhen	QHSE	CGOC	
3.	Qiang Jiaoli	QHSE	CBBL	
4.	Syed Bakar Ali	HSE-Incharge	CGGC	
5.				
6.	Li Jing	QHSE	CBBC	
7.	Wang Jie	PM	CGGL	
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

Four Seasons Hotel, Near PTCL Exchange, Shahid Najaf Khan, Kaghan Road Balakot, District Mansehra Khyber Pakhtunkhwa, Pakistan
Tel: +92-0997-360155

Annexure-02: Due Diligence of Muck Disposal Sites

Balakot HPP (300 MW) Due-Diligence of the Identified Muck Disposal Sites September 25-26, 2023

S/ No	Muck Disposal Site	Muck Capacity (m^3) (Estimated by the EPC Contractor	Preliminary Assessment	Feasible/Not Feasible	EPC Contractor's Required Action	EPC Contractor's Submissions for Final Approval
1.	Powerhouse -2	100,000	I. Protection and drainage works required. II. Area falls under permanent land acquired for R-3	**Feasible** subject to provision of protection and drainage works	Design of protection and drainage Works	Submission of protection works and drainage drawings for the PMC review and approval
2.	Powerhouse -3	550,000	I. Area at upper elevation with no access II. Valley has steep slopes III. Impact on trees. V. Muck compaction and stability will be an issue V. No sufficient space available for mucking	**Not feasible**	Identify alternate site	Nil
3.	Powerhouse -4	30,000	I. Impact on few trees II. Insufficient space for mucking III. Huge protection works along the Kunhar River will be required V. Access to the area will be needed V. Apparently, not cost effective identification	Apparently **not feasible** however, if the EPC Contractor is agreed to provide huge protection works along the Kunhar River, the area may be acceptable for mucking.	Either: I. identify alternate site; or II. design protection works along the Kunhar River and provide access to the site.	I. No submission required if site is discarded by the EPC Contractor as recommended by the PMC II. If the EPC Contractor agreed to provide access to the site; protection works along the Kunhar River, and trees then submission of design and drawings of the above will be required for the PMC review and approval.
4.	Powerhouse -5	550,000	I. Protection along the Kunhar River needed II. Cutting of trees involved II. Access across the nullah will be needed V. Construction of box culvert or bridge.	**Feasible** subject to: I. provision of protection along the Kunhar River; II. compensatory tree plantation; and II. construction of access road across the nullah IV.	I. Design, protection work all along the Kunhar River and access to the identified site II. Tree compensation and plantation III. Temporary land acquisition	Submission of the following for the PMC review and approval: I. protection work, access road and bridge/box across the nullah; and II. Compensatory tree plantation plan as part of the overall Tree Plantation Plan
5.	Powerhouse -1	20000	I. Huge protection work will be required along the Kunhar River II. Capacity will be reduced due to protection works construction III. Mostly lying in the River bed	**Not feasible**	Identify alternate site	Nil
6.	A3 Spoil Deposit	400,000	I. PMC Comments already traded with the EPC Contractor II. The EPC Contractor response is awaited.	**Feasible** subject to: I. incorporation of the PMC comments. II. Provision of protection works	Response to the PMC comments	Submission of the following for the PMC review: I. protection works design; II. channelization of stream; II. tree compensation plan

S/ No	Muck Disposal Site	Muck Capacity (m^3) (Estimated by the EPC Contractor	Preliminary Assessment	Feasible/Not Feasible	EPC Contractor's Required Action	EPC Contractor's Submissions for Final Approval
				III. Channelization of stream water		
7.	A3 used spoil deposit	Not given	I. Muck leveled for construction and installation of temporary facilities II. The area in front of the demolished workshop has no vivid capacity and requires huge protection works	The area identified in front of the demolished workshop is **not feasible** for mucking due to huge protection works and no vivid capacity.	I. Channelization of stream under passing through temporary facilities. II. Protection works design. II. No action required for the area not feasible for mucking	I. Submission of design of the protection works for the part of identified area used for temporary facilities for the PMC review and approval. II. No submission for area in front of demolished area as the area is not feasible.
8.	A2	380,000	I. Dense trees on the upper part of the identified area II. Capacity appears less III. Site is identified at the nullah bed level V. All weather protection works will be needed	I. **Not feasible** being identified on the same level of the Ganhool Nullah. II. Nevertheless, if EPC Contractor provide all weather protection works, then a small part of the identified area may be used for muck disposal II. RoW of the perennial Ganhool Nullah and upper parts are not permitted to be used for muck disposal.	Design of protection works, if the EPC Contractor intend to use some parts of the identified area.	If the EPC Contractor intend to opt for some parts of the identified area, then shall submit protection works and levels showing the elevation of muck disposal areas.
9.	A1	510,000	I. No access road to the identified disposal area II. Cutting of trees along the slope III. Protection works along the perennial Kawai Nullah.	**Feasible** subject to: I. provision of protection works along the Kawai Nullah; II. construction of access road; and compensatory tree plantation.	I. Design of protection works and access road II. Compensatory tree plantation	Submission of the following for the PMC review and approval. I. Design of protection works and access road II. Compensatory tree plantation plan as part of the overall Tree Plantation Plan.
10.	Dam site deposit	550,000	I. No space available in the narrow Sacha valley II. Identified area falls in the Sacha perennial stream III. There are houses/built-up property in valley which will be affected by the mucking operation V. Cascade protection works will be needed	**Not feasible.** Muck disposal in the perennial stream or any other water body is not permitted.	Identify alternate site	Nil

S/ No	Muck Disposal Site	Muck Capacity (m^3) (Estimated by the EPC Contractor	Preliminary Assessment	Feasible/Not Feasible	EPC Contractor's Required Action	EPC Contractor's Submissions for Final Approval
			V. For mucking operation, apparently, vehicles will travel to the elevated parts of the existing access road to off load muck			

Annexure-03: Minutes of Basin-wide BAP Consultation Meetings

Minutes of Basin-wide BAP Virtual Consultation Meeting Held on 14th November, 2023

Balakot Hydropower Project (300 MW)
District Mansehra

Minutes of Virtual (Zoom) Meeting with the Prospective Financiers of Basin- wide BAP

Agenda: Biodiversity Action Plan (BAP) financing provisions in the EIA reports/tariff of hydropower projects in the Jhelum Basin and assessment of challenges in its materialization.

Meeting held on: 14th November, 2023

List of Participants:

- Mr. Aziz Raza: Project Director Balakot HPP (300 MW)
- Miss Ibtesam Zaima Khan: Deputy Director (E&HS and Gender) Balakot HPP(300 MW)
- Mr. Assad Ali Khan : Environmental Expert of PMC-Balakot HPP (300MW)
- Mr. N A Zuberi: Senior Advisor CSAIL, Karot, Mahl, and Kohala HPPs
- Mr. Naeem Akhtar: Senior Manager Environment Karot, Mahl and Kohala HPPs
- Mr. Shah Abd Ullah: Assistant Manager PD, 700.7MW Azad Pattan HPP

Background

In continuation of consultation meetings, held with the stakeholders in August and September 2022, and thereafter, as agreed with the Asian Development Bank (ADB) Safeguard team, the Project Implementation Unit (PIU) of BTHPP (300 MW) arranged a virtual meeting on the agenda item cited above. The meeting was participated by the representatives of the Basin-wide BAP prospective financiers (as identified in the EIA report of Balakot HPP) and Environmental Expert of PMC.[22]

Meeting Objectives

(i) Familiarization of the prospective financiers with the Basin-wide BAP contained in the Environmental Impact Assessment (EIA) report of the Balakot HPP (300 MW).
(ii) Assessment of the Jhelum Basin hydropower projects commitment towards BAP funding.
(iii) Know-how attainment of the BAP budgetary provisions contained in the EIA report/tariff of prospective financiers.
(iv) Identification of challenges in funding/materialization of Basin-wide BAP.

Meeting Proceedings

Subsequent to the participants brief introduction, the Project Director of Balakot HPP (300 MW) initiated the meeting proceedings by highlighting the meeting objectives and shedding light on various activities undertaken by the PIU in the Basin-wide BAP context. He also shared the PIU assessment of the consultation meetings carried out in the year 2022.

Before opening the floor for open discussion on the Basin-wide BAP, the Project Director invited Environmental Expert of the PMC to present BAP provisions contained in the Balakot HPP (300 MW) EIA report with particular emphasis on institutional and budgetary arrangements therein.

The presentation, jointly delivered by the PIU and PMC representatives, was mainly focused on:

(i) Balakot Hydropower Project introduction and Contract Management.

[22] Representatives of the prospective financiers (Patrind and Sukki Kinari HPPs) of Watershed Management Organization (WMO), envisioned for the Kunhar Basin however, could not attend the meeting due to their engagements. Consequently, a separate virtual meeting was held with them on November 17, 2023.

(ii) Basin-wide BAP objectives; institutional arrangement; and PEDO's financial contributions in establishment of the Institute for Research on River Ecology (IRRE) and Watershed Management Organization (WMO).
(iii) Details of various activities undertaken by PIU towards Basin-wide BAP materialization.
(iv) A brief overview of BAP in the Area of Management under Balakot HPP (300 MW).

During the course of presentation, participants were apprised that a detailed report i.e. Basin-wide BAP Consultation Report, containing details of the consultation meetings held with the stakeholders, was furnished and shared with the Asian Development Bank for their consent on the PIU recommendations framed in light of the consultation findings.

Subsequent to the detailed presentation, the Project Director asked participants to present their view points on the agenda items.

The representatives of Karot, Kohala, Mahal and Azad Pattan HPPs openly expressed their view points and shed light on array of challenges in funding IRRE and WMO. They also discussed foreseeable delay in the development of hydropower projects identified in the Jhelum Basin.

The discussion held and view-points presented in the virtual meeting are synopsized as hereunder.

(i) There exist provision of the Basin-wide BAP in some of the projects like Kohala, Azad Pattan, Karot HPPs etc. however, so far, no step has been taken by any of the project developer towards process initiation, mainly due to uncertainty of cost compensation and delay in the project execution.
(ii) Although, PEDO share has been mentioned however, it is not clear what the overall budget is for IRRE and WMO establishment. Also, there are a number of other hydropower projects in the Jhelum Basin however, their financial contributions are not clear. Without knowing the IREE and WMO estimated budget, it may not be possible for the hydropower developers to make commitment of their contributions.
(iii) Similarly, it is not clear how shares of various projects contributions have been fixed or would be fixed in future? Apparently, there is no sound mechanism for allocating such shares.
(iv) There are operational projects in the Jhelum Basin where no BAP obligations exist. Neelum Jhelum and Patrind HPPs are the two projects in the instant case. It is not clear how such projects would contribute in Basin-wide BAP without making necessary adjustments in their Commercial Operation Date (COD) tariff.
(v) Apparently, unless IRRE and WMO establishment and associated recurring costs compensation are not guaranteed in the individual project tariff, monetary contributions by the Jhelum Basin hydropower developers appear obscure.
(vi) In spite of the fact that other obligations are fulfilled, the development of hydropower projects are facing persistent delays which will have direct bearing on the BAP materialization.
(vii) The provincial and AJK environmental regulatory agencies should be given a leading role in the planning and implementation of Basin-wide BAP as they are custodian of the environmental portfolio while their instructions are legally binding enabling projects to claim the related costs in their tariff.
(viii) In the absence of policy guidelines, collective efforts, and the leading role of federal or the provincial government relevant ministry, materialization of the Basin-wide BAP appears an uphill task for an individual project/developer.

Recommendations

Most of the participants recommended that:

(i) Collective Response

As Basin-wide BAP is an initiative aimed with collective response towards the environmental impacts caused by the hydropower project development so as to ensure sustainable development in environment friendly way hence, it would not be possible for an individual project to undertake such an initiative rather an Institution such as Private Power and Infrastructure Board (PPIB) which is attuned to safeguarding the environment should take a lead role in this regard.

As establishment and operation of IRRE and WMO is a complex matter hence, for Balakot or any other hydropower project, it would not be possible to convince the Jhelum Basin projects on BAP financing.

(ii) Consultation with all Projects

Other hydropower projects, whether mentioned in the Balakot HPP (300 MW) EIA report or not, should also be consulted to devise a collective approach in the matter.

(iii) Joint Meeting

Keeping in view the challenges at fore, it was agreed that a joint meeting of the Basin-wide BAP stakeholders, including PPIB, relevant entities in provinces and AJK and lenders including the Balakot HPP (300 MW) financiers will be convened to set an appropriate course of action.

Conclusion

The Project Director Balakot HPP (300 MW) concluded the meeting with gratitude to the participants and encouraged them to share their written recommendations. These will be discussed with the Safeguard team of the ADB and Asian Infrastructure Investment Bank (AIIB).

MINUTES OF BASIN-WIDE BAP VIRTUAL CONSULTATION MEETING HELD ON 17TH NOVEMBER, 2023

Balakot Hydropower Project (300 MW)
District Mansehra

Minutes of Virtual (Zoom) Meeting with the Prospective Financiers of Basin- wide BAP

Agenda: BAP financing provisions in the EIA reports/tariff of hydropower projects in the Jhelum Basin and assessment of challenges in its materialization.

Meeting held on: 17th November, 2023

List of Participants:

- Mr. Aziz Raza: Project Director Balakot HPP (300 MW)
- Miss Ibtesam Zaima Khan: Deputy Director (E&HS and Gender) Balakot HPP(300 MW)
- Mr. Assad Ali Khan : Environmental Expert of PMC-Balakot HPP (300 MW)
- Mr. Hasnain Ashfaq Hashmi: Environmental Manager(QHSE) Suki Kinari HPP (884 MW)
- Mr. Sayyed Atif Ali Shah Senior Manager ENS Patrind HPP (150 MW)

Background

In continuation of consultation meetings, held with the stakeholders in August and September 2022, and thereafter, as agreed with the Asian Development Bank (ADB) Safeguard team, the Project Implementation Unit (PIU) of BTHPP (300 MW) arranged a virtual meeting on November 14, 2023, on the agenda item cited above. However, as representatives of the prospective financiers (Patrind and Sukki Kinari HPPs) of Watershed Management Organization (WMO), envisioned for the Kunhar Basin, could not attend the meeting due to their engagements, thus a separate meeting (this meeting) was arranged for them on the same agenda item.

Meeting Objectives

(v) Familiarization of the prospective financiers with the Basin-wide BAP contained in the EIA report of the Balakot HPP (300 MW).
(vi) Assessment of the Jhelum Basin hydropower projects commitment towards BAP funding.
(vii) Know-how attainment of the BAP budgetary provisions contained in the EIA report/tariff of prospective financiers.
(viii) Identification of challenges in funding/materialization of Basin-wide BAP.

Meeting Proceedings

Subsequent to the participants brief introduction, the Project Director of Balakot HPP (300 MW) initiated the meeting proceedings by highlighting the meeting objectives and shedding light on various activities undertaken by the PIU in the Basin-wide BAP context. He also shared the PIU assessment of the consultation meetings carried out in the year 2022.

Before opening the floor for open discussion on the Basin-wide BAP, the Project Director invited Environmental Expert of the PMC to present BAP provisions contained in the Balakot HPP (300 MW) EIA report with particular emphasis on institutional and budgetary arrangements therein.

The presentation delivered by Environmental Expert was mainly focused on:

(v) Balakot Hydropower Project introduction and Contract Management.
(vi) Basin-wide BAP objectives; institutional arrangement; and PEDO's financial contributions in establishment of the Institute for Research on River Ecology (IRRE) and Watershed Management Organization (WMO).
(vii) Details of various activities undertaken by PIU towards Basin-wide BAP materialization.
(viii) A brief overview of BAP in the Area of Management under Balakot HPP (300 MW).

During the course of presentation, participants were apprised that a detailed report i.e. Basin-wide BAP Consultation Report, containing details of the consultation meetings held with the stakeholders, was furnished and shared with the Asian Development Bank for their consent on the PIU recommendations framed in light of the consultation findings.
Subsequent to the detailed presentation, the Project Director asked participants to present their view points on the agenda items.
The discussion held and view-points presented in the virtual meeting are synopsized as hereunder.

(ix) The representatives of Patrind and Sukki Kinari HPPs openly expressed their view points and shed light on earlier efforts made in this regard. The Patrind HPP (150 MW) representative recalled that ADB and IFC had previously made efforts to bring proponents of the hydropower projects on one platform thereby forming Hydropower Development Group however, after a period of around 3 years, the efforts couldn't get any momentum.

(x) As Basin-wide BAP provisions were not made part of the EIA reports of both the projects hence, no budget allocations were made in the project development.

(xi) There are operational projects in the Jhelum Basin where no BAP obligations exist. Neelum Jhelum and Patrind HPPs are the two projects in the instant case. It is not clear how such projects would contribute in Basin-wide BAP without making necessary adjustments in their Commercial Operation Date (COD) tariff.

(xii) Apparently, unless IRRE and WMO establishment and associated recurring costs compensation are not guaranteed in the individual project tariff, monetary contributions by the Jhelum Basin hydropower developers appear obscure.

(xiii) The Patrind HPP (150 MW) is operational since years, without having any BAP budgetary provisions in its COD tariff hence, the Project would not be able to monetarily contribute in Basin-wide BAP initiatives although, the management is in full agreement with the initiative.

(xiv) As the Sukki Kinari HPP (884 MW) COD level tariff is yet to be approved by NEPRA, hence, monetary contribution in BAP will then be decided by the management of the Project.

(xv) In the absence of policy guidelines, collective efforts, and the leading role of federal or the provincial government relevant ministry, materialization of the Basin-wide BAP appears quite challenging under the circumstances.

Conclusion

The Project Director Balakot HPP (300 MW) concluded the meeting with gratitude to the participants and encouraged them to share their written recommendations. These will be discussed with the Safeguard team of the ADB and Asian Infrastructure Investment Bank (AIIB).

Annexure-04: Copies of Instrumental Environmental Monitoring

Ambient Air Monitoring Results (Third Quarter, 2023)-Particulate Matters

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number		Client Name	
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Locations:	Dam Site (Penstock Valley)
Monitoring Date:	04.10.2023	Reporting Date:	17.10.2023
Season:	Ambient Air	Monitoring Instrument:	AQMS ID, Serial # 1310
GPS Coordinates:	34.906173, 73.458167		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
	Hours of Monitoring	Units			
		(mm³)	(µg/m³)		
1.	09:00 A.M.	18.02	98.10	64.98 (µg/m³)	93.92 (µg/m³)
2.	10:00 A.M.	18.37	99.73		
3.	11:00 A.M.	18.35	87.9		
4.	12:00 P.M.	16.2	80.79		
5.	01:00 P.M.	18.25	80.34		
6.	02:00 P.M.	18.29	91.53		
7.	03:00 P.M.	18.55	90		
8.	04:00 P.M.	16.12	54.78		
9.	05:00 P.M.	18.83	81.05		
10.	06:00 P.M.	15.8	68.08		
11.	07:30 P.M.	13.03	48.31		
12.	09:00 P.M.	16.43	49.19		
13.	08:30 P.M.	13.50	47.07		
14.	10:30 P.M.	14.9	49.34		
15.	11:30 P.M.	12.94	45.82		
16.	12:30 A.M.	12.66	47.26		
17.	01:30 A.M.	13.08	48.56		
18.	02:30 A.M.	14.02	43.89		
19.	03:30 A.M.	13.69	44.26		
20.	04:30 A.M.	13.01	42.99		
21.	05:30 A.M.	12.1	43.41		
22.	06:00 A.M.	12.26	45.72		
23.	07:00 A.M.	13.91	46.83		
24.	08:00 A.M.	14.43	47.76		
NEQSAA				(µg/m³)	(µg/m³)
WHO				(µg/m³)	(µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement with error sign(+) after every value is stated.
- The client is responsible for safe usage of reported data in future.
- The reporting will valid for court.

Technical Manager

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 04, Mir Ali Circle Road, Abshaar Colony Riverside Road, Peshawar, Pakistan
Tel: +92 91 5272313 Cell: +92 3000 9010 63, Email: info@iel-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:		Client Name:	
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adjacent (Thoker)
Monitoring Date:	09-12-2023	Reporting Date:	17.12.2023
Source:	Ambient Air	Monitoring Instrument:	

Sr. No.	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Intervals of Monitoring	(µg/m³)	(µg/m³)		
1	12:00 A.M	27.31	90.10		
2	01:00 A.M	28.79	89.08		
3	02:00 A.M	26.83	91.07		
4	03:00 A.M	30.09	84.6		
5	04:00 A.M	30.11	83.25		
6	05:00 A.M	30.47	91.44		
7	06:00 A.M	26.41	86.07		
8	07:00 A.M	26.01	88.70		
9	08:00 A.M	27.91	79.24		
10	09:00 A.M	26.68	79.52		
11	10:00 A.M	25.91	78.79		
12	11:00 A.M	26.91	79.27	28.04 (µg/m³)	77.85 (µg/m³)
13	12:00 P.M	24.91	75.50		
14	01:00 P.M	27.18	76.60		
15	02:00 P.M	24.02	76.1		
16	03:00 P.M	26.8	87.57		
17	04:00 P.M	29.64	87.34		
18	05:00 P.M	27.01	83.23		
19	06:00 P.M	25.61	88.78		
20	07:00 P.M	23.30	81.87		
21	08:00 P.M	29.06	87.60		
22	09:00 P.M	22.11	76.2		
23	10:00 P.M	20.79	71.11		
24	11:00 P.M	27.31	74.7		
NEQS/USEPA				35 (µg/m³)	150 (µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQS/USEPA: National Environmental Quality Standards for Ambient Air / United States Environmental Protection Agency

WHO: World Health Organization

Note:

- Balakot Hydropower Project was operational during the period of monitoring.
- The above results are applicable only at the time of monitoring.
- This report is not valid for court.

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	M-HPE/SMTC-0323	Client Name:	Colony, (2 GPS)
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adit-3 (Downhill)
Monitoring Date:	05.10.2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Ambient Air 34.616161, 73.411525	Monitoring Instrument:	AQMS-Wi, Serial # 1213

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
	Hours of Monitoring	Units			
		(µg/m³)	(µg/m³)		
1	09:00 A.M	22.3	76.61	22.19 (µg/m³)	97.83 (µg/m³)
2	10:00 A.M	21.93	75.09		
3	11:00 A.M	22.01	74.33		
4	12:00 P.M	21.78	77.02		
5	01:00 P.M	21.29	78.07		
6	02:00 P.M	21.69	79.56		
7	03:00 P.M	21.59	72.83		
8	04:00 P.M	21.19	71.81		
9	05:00 P.M	22.09	68.39		
10	06:00 P.M	20.89	69.87		
11	07:00 P.M	20.00	66.14		
12	08:00 P.M	19.49	66.87		
13	09:00 P.M	20.89	63.8		
14	10:00 P.M	20.26	65.17		
15	11:00 P.M	17.1	62.65		
16	12:00 A.M	20.89	66.61		
17	01:00 A.M	18.12	59.39		
18	02:00 A.M	20.89	60.68		
19	03:00 A.M	20.99	61.11		
20	04:00 A.M	19.87	59.42		
21	05:00 A.M	20.19	60.27		
22	06:00 A.M	17.29	63.59		
23	07:00 A.M	18.87	63.46		
24	08:00 A.M	20.19	66.21		
NEQSAA				80 (µg/m³)	120(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected parameters units are in µg/m³ otherwise stated.
- The client is responsible for safe usage of reported data in future.
- The report is not valid for court.

Signature of Analyst

Signature of Incharge / Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Shop# No. 09, Main Canal Road, Khyber Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5303323 Cell: +92 3005331063 Email: iewconsultants@yahoo.com www.iel-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number		Client Name	
Project Name:	District: Project:	Monitoring Location:	
Monitoring Date:		Monitoring Date:	
Source:		Monitoring Instrument:	

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM10	PM2.5	PM10	PM2.5
	Hours of Monitoring	Unit			
1.	08:00 A.M	31.21	57.04		
2.	09:00 A.M	30.94	57.01		
3.	11:00 A.M	31.12	56.23		
4.	12:00 P.M	36.07	66.89		
5.	01:00 P.M	28.6	53.1		
6.	02:00 P.M	30.78	61.09		
7.	03:00 P.M	28.7	54.55		
8.	04:00 P.M	28.3	53.34		
9.	05:00 P.M	28.2	52.42		
10.	06:00 P.M	27.07	50.9		
11.	07:00 P.M	23.8	57.17		
12.	08:00 P.M	25.6	48.60	26.04 (µg/m³)	58.18 (µg/m³)
13.	09:00 P.M	24.1	46.81		
14.	10:00 P.M	31.07	60.2		
15.	11:00 P.M	33.21	64.55		
16.	12:00 A.M	24.09	51.93		
17.	01:00 A.M	33.23	61.17		
18.	02:00 A.M	24.8	57.71		
19.	03:00 A.M	24.1	53.14		
20.	04:00 A.M	23.68	51.45		
21.	05:00 A.M	23.27	52.3		
22.	06:00 A.M	22.4	54.88		
23.	07:00 A.M	21.85	55.46		
24.	08:00 A.M	23.0	56.41		
NEQSAA				24 (µg/m³)	60 (µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated.
- The client is responsible for lawful usage of reported data in any case.
- This report is not valid for court.

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-KPK) Certified

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:		Client Name:	
Project Name:		Monitoring Location:	
Monitoring Date:		Reporting Date:	
Source:		Monitoring Instrument:	
GPS Coordinates:			

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM10	PM2.5		
		Units		PM10	PM2.5
	Hours of Monitoring	(µg/m³)	(µg/m³)		
1.	09:00 A.M	26.40	107.69		
2.	10:00 A.M	23.19	139.25		
3.	11:00 A.M	31.27	107.3		
4.	12:00 P.M	32.32	110.08		
5.	01:00 P.M	30.65	109.04		
6.	02:00 P.M	30.61	108.97		
7.	03:00 P.M	30.85	135.8		
8.	04:00 P.M	33.45	184.66		
9.	05:00 P.M	29.08	131.20		
10.	06:00 P.M	25.06	98.80		
11.	07:00 P.M	24.32	87.74		
12.	08:00 P.M	24.12	88.83	27.29 (µg/m³)	83.15 (µg/m³)
13.	09:00 P.M	28.23	86.67		
14.	10:00 P.M	25.39	86.19		
15.	11:00 P.M	25.55	84.66		
16.	12:00 A.M	30.21	81.62		
17.	01:00 A.M	31.36	81.4		
18.	02:00 A.M	23.80	82.80		
19.	03:00 A.M	26.03	83.12		
20.	04:00 A.M	24.8	81.40		
21.	05:00 A.M	24.35	80.20		
22.	06:00 A.M	22.54	84.68		
23.	07:00 A.M	25.7	80.42		
24.	08:00 A.M	25.72	89.19		
NEQSAA				35 (µg/m³)	150(µg/m³)
WHO				45 (µg/m³)	40 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Calculated measurement units were µg/m³ otherwise mg/m3
- The plant is not working due to usage of repaired data is failure.
- The report is not valid for court.

Analyst

Director / Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Office No.09, Main Canal Road, Khanewal Colony Shanaki Road, Peshawar, Pakistan

Tel: +92 91 5303939 Cell: +92 3030 8010 33 Email: engr.waqar.iqbal@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Tehsil Upazilah (Sukkur)
Monitoring Date:	[illegible]	Reporting Date:	17-10-2023
Source:	Ambient Air	Monitoring Instrument:	AQMS GS Serial # 1240
GPS Coordinates:	34.489006, 73.3214012		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}		
		Units		$PM_{2.5}$	PM_{10}
	Hours of Monitoring	(µg/m³)	(µg/m³)		
1.	09:00 A.M	24.16	36.61	17.91 (µg/m³)	28.67 (µg/m³)
2.	10:00 A.M	21.81	37.58		
3.	11:00 A.M	19.98	33.53		
4.	12:00 P.M	19.24	34.22		
5.	01:00 P.M	16.37	37.67		
6.	02:00 P.M	19.65	34.36		
7.	03:00 P.M	19.57	34.43		
8.	04:00 P.M	09.17	33.21		
9.	05:00 P.M	19.07	28.90		
10.	06:00 P.M	10.84	26.47		
11.	07:00 P.M	19.07	26.14		
12.	08:00 P.M	19.47	34.20		
13.	09:00 P.M	19.97	33.3		
14.	10:00 P.M	17.34	24.77		
15.	11:00 P.M	19.09	24.20		
16.	12:00 A.M	19.86	21.50		
17.	01:00 A.M	18.3	33.86		
18.	02:00 A.M	17.87	32.28		
19.	03:00 A.M	19.87	22.71		
20.	04:00 A.M	18.88	21.53		
21.	05:00 A.M	19.14	21.87		
22.	06:00 A.M	19.27	24.19		
23.	07:00 A.M	18.85	25.66		
24.	08:00 A.M	17.47	29.63		
NEQSAA				80 (µg/m³)	150(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Recorded measurement units were µg/m³ otherwise stated.
- The client is responsible for usage of reported data in future.
- This Report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

Integrated Environment Laboratory

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Afghanan Colony, Warsak Road, Peshawar, Pakistan
Tel: +92 91 5702323 Cell: +92 3000 891259 Email: [illegible] www.iel-consultants.com

Environment Protection Agency (EPA-KPK) Certified

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number		Client Name	CGGC JV QRC
Project Name	National Hydropower Project (220 MW)	Monitoring Location	QRC Camp (Skardu)
Monitoring Date	16.12.2023	Reporting Date	17-12-2023
Report to	Assistant Ma	Monitoring Instrument	AQM-5 s.n. 3[illegible]
GPS Coordinates	35°16'[illegible]" N, 75°37'[illegible]" E		

Sr. No.	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}		
		Units			
	Hours of Monitoring	µg/m³	µg/m³		
1.	09:00 A.M	28.58	70.02		
2.	10:00 A.M	33.07	71.4		
3.	11:00 A.M	34.75	69.65		
4.	12:00 P.M	34	73.14		
5.	01:00 P.M	34.03	71.69		
6.	02:00 P.M	34.39	70.68		
7.	03:00 P.M	34.33	68.38		
8.	04:00 P.M	33.95	67.13		
9.	05:00 P.M	32.03	63.91		
10.	06:00 P.M	31.8	62.39		
11.	07:00 P.M	30.02	60.68		
12.	08:00 P.M	31.28	62.14	32.07 µg/m³	N/A
13.	09:00 P.M	47.13	92.42		
14.	10:00 P.M	27.1	54.66		
15.	11:00 P.M	19.04	50.17		
16.	12:00 A.M	21.12	52.44		
17.	01:00 A.M	23.46	54.91		
18.	02:00 A.M	29.43	58.2		
19.	03:00 A.M	31.73	60.83		
20.	04:00 A.M	27.31	56.94		
21.	05:00 A.M	30.8	59.19		
22.	06:00 A.M	32.09	63.07		
23.	07:00 A.M	29.71	60.06		
24.	08:00 A.M	22.25	50.97		
NEQS/NAAQS				35 µg/m³	150µg/m³
WHO				15 µg/m³	45 µg/m³

NEQS/NAAQS: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:
- Results are reported in µg/m³ unless stated.
- The client is responsible for providing the sampling data.
- The results relate only to the items tested.

Signature of Analyst

Signature of Authorized Person

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Office: No. 03, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5307473 Cell: +92 3007301033 Email: iec.consultants@yahoo.com www.iec-consultants.com
Environmental Protection Agency (EPA) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTER MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Project [illegible] Project 2023(03)	Monitoring Location:	Colony Area (Sangilat)
Monitoring Date:	11-12-2023	Reporting Date:	13.12.2023
Source:	Ambient Air	Monitoring Instrument:	AQMS 05 Serial # 1312
GPS Coordinates:	34.987775, 73.358001		

Sr. No.	Time	Parameters		Results (Average 24 Hrs)	
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
		Units			
	Reading at Monitoring	(µg/m³)	(µg/m³)		
1.	09:00 AM	27.84	16.71		
2.	10:00 AM	19.99	10.49		
3.	11:00 AM	15.04	04.62		
4.	12:00 PM	24.20	01.82		
5.	01:00 PM	24.32	10.27		
6.	02:00 PM	24.03	05.39		
7.	03:00 PM	34.67	03.03		
8.	04:00 PM	44.91	01.81		
9.	05:00 PM	10.11	40.59		
10.	06:00 PM	18.46	46.07		
11.	07:00 PM	16.71	48.34		
12.	08:00 PM	16.11	51.84	60.26 (µg/m³)	31.01 (µg/m³)
13.	09:00 PM	16.61	55.1		
14.	10:00 PM	16.06	41.30		
15.	11:00 PM	14.72	12.65		
16.	12:00 AM	15.4	41.13		
17.	01:00 AM	16.74	40.59		
18.	02:00 AM	17.21	41.56		
19.	03:00 AM	16.81	42.01		
20.	04:00 AM	16.19	40.03		
21.	05:00 AM	16.78	11.47		
22.	06:00 AM	14.91	43.19		
23.	07:00 AM	16.46	44.88		
24.	08:00 AM	17.11	46.06		
NEQSAA				35 (µg/m³)	150(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- [illegible]
- [illegible]
- [illegible]

Signature of Analyst:

Signature of QSM/Manager

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Mir Colony Road, Rehman Colony Warsak Road, Peshawar, Pakistan
Cell: +92 300 5501053 Email: [illegible]@yahoo.com www.iel-consultants.com
Environmental Protection Agency (EPA) Certified

Ambient Gaseous Monitoring Results (Third Quarter, 2023)

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:		Client Name:	
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Dam Site (Pakistan Valley)
Monitoring Date:	[illegible]	Reporting Date:	17.10.2023
Source:	Ambient Air Gases	Monitoring Instrument:	APM 651, Model # 1319
GPS Coordinates:	[illegible]		

Sr. No	Time	Parameters			
		CO	NO_2	NO	SO_2
		Units			
	Hours	(mg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1	06:30 A.M	0.67	9.38	11.58	5.82
2	10:30 A.M	0.67	10.22	11.46	5.6
3	01:30 A.M	0.58	10.5	11.09	6.21
4	04:30 P.M	0.6	11.03	10.94	5.9
5	01:30 P.M	0.63	10.49	10.91	5.75
6	07:30 P.M	0.62	10.62	10.97	6.13
7	01:00 P.M	0.5	11.17	11.26	6.23
8	04:00 P.M	0.58	10.7	11.43	6.04
9	09:00 P.M	0.41	9.47	10.05	7.17
10	05:00 P.M	0.47	8.91	11.07	6.03
11	01:00 P.M	0.49	10.52	11.56	5.58
12	09:00 P.M	0.42	10.23	10.78	6.06
13	09:00 P.M	0.44	10.53	11.15	5.83
14	10:00 P.M	0.62	9.44	11.04	6.49
15	11:00 P.M	0.45	9.21	11.67	5.44
16	12:00 A.M	0.45	10.18	11.53	6.13
17	01:00 A.M	0.62	10.29	12.05	5.65
18	02:00 A.M	0.61	9.81	11.63	5.46
19	03:00 A.M	0.61	11.3	10.7	6.14
20	04:30 A.M	0.62	10.51	10.84	6.55
21	05:30 A.M	0.47	10.27	9.15	6.91
22	06:30 A.M	0.45	9.8	10.82	5.89
23	07:30 A.M	0.41	10.34	10.61	6.31
24	08:00 A.M	0.5	9.75	11.41	5.24
Average Concentration		0.47	10.16	11.05	6.04
NEQSAA		05	40	80	120
WHO		04	-	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- [illegible]
- [illegible]
- [illegible]

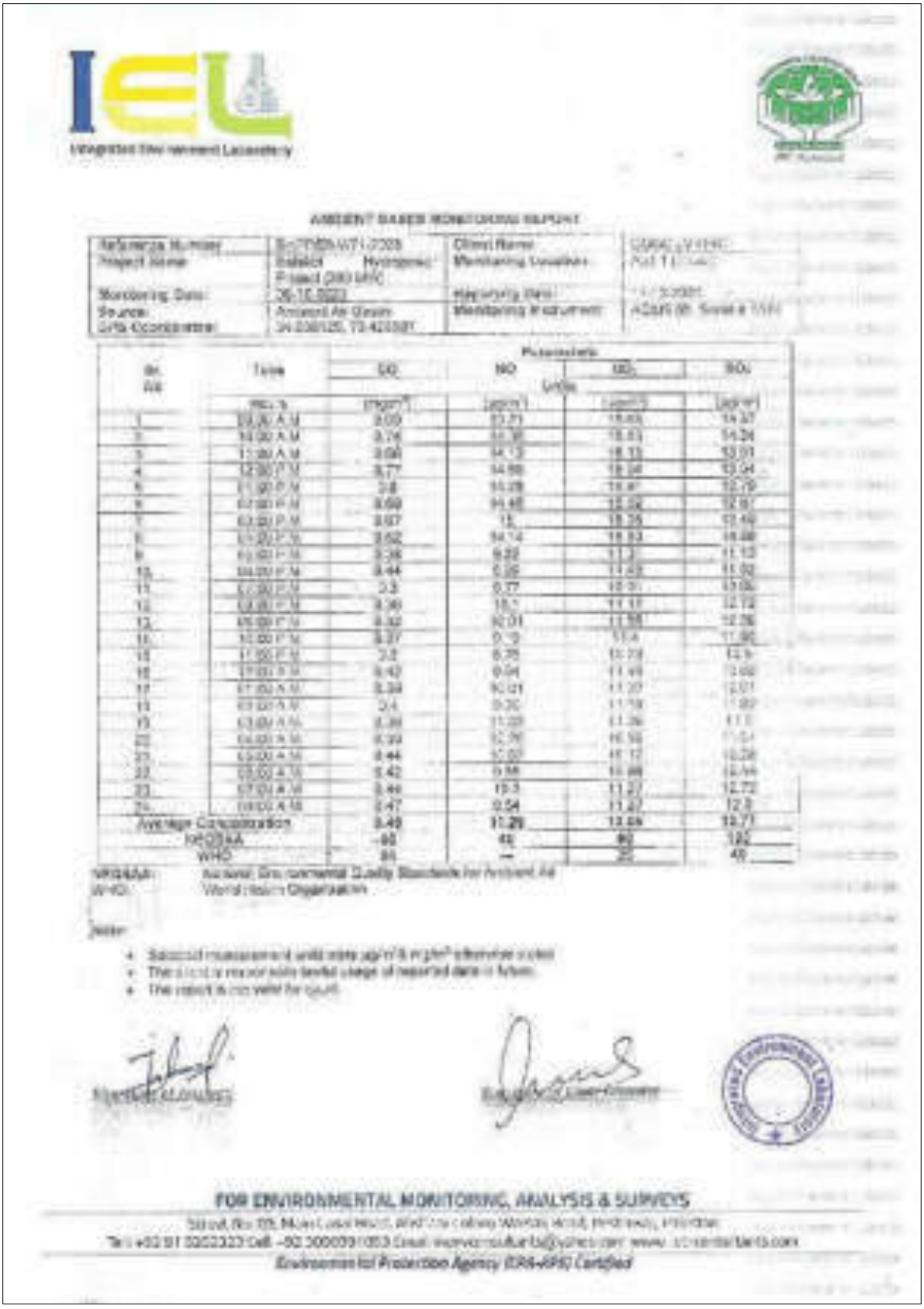
Signature of Analyst

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-NPA) Certified



AMBIENT BASED MONITORING REPORT

Reference Number:		Client Name:	
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	
Monitoring Date:	26-10-2023	Reporting Date:	
Source:	Ambient Air Quality	Monitoring Instrument:	
GPS Coordinates:	34.538125, 73.421597		

Sr. No.	Time	Parameters			
		SO2	NO	NO2	SO2
		Units			
	Hours	(mg/m³)	(ppm)	(ppm)	(ppm)
1	09:30 A.M	3.09	12.71	15.63	14.37
2	10:30 A.M	3.74	11.38	15.51	14.24
3	11:30 A.M	3.66	14.13	15.13	13.91
4	12:30 P.M	3.77	14.98	15.24	13.94
5	01:30 P.M	3.8	14.28	14.8	13.79
6	02:30 P.M	3.69	14.48	15.06	13.8
7	03:30 P.M	3.67	15	15.25	13.49
8	04:30 P.M	3.62	14.14	15.53	14.08
9	05:30 P.M	3.36	9.22	11.2	11.13
10	06:30 P.M	3.44	9.05	11.43	11.02
11	07:30 P.M	3.3	8.77	10.91	10.86
12	08:30 P.M	3.36	15.1	11.17	12.73
13	09:30 P.M	3.32	10.01	11.56	12.36
14	10:30 P.M	3.37	9.3	11.4	11.96
15	11:30 P.M	3.5	8.75	10.78	11.5
16	12:30 A.M	3.42	9.04	11.49	12.02
17	01:30 A.M	3.39	10.01	11.27	12.01
18	02:30 A.M	3.4	9.26	11.78	12.02
19	03:30 A.M	3.39	11.09	11.36	11.5
20	04:30 A.M	3.39	12.29	10.52	11.24
21	05:30 A.M	3.44	12.02	10.12	10.28
22	06:30 A.M	3.42	9.58	10.88	10.44
23	07:30 A.M	3.44	10.3	11.27	12.72
24	08:30 A.M	3.47	9.54	11.42	12.8
Average Concentration		3.49	11.29	13.69	13.71
NEQS/KA		80	40	80	120
WHO		80	—	200	40

NEQS/KA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Saturated measurement units were µg/m³ & mg/m³ otherwise v/v(ppm)
- The result is recommended for use.
- The result is not valid for court.

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-KPK) Certified

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	CGGC JV ORG
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	ABS-2 (Channel)
Monitoring Date:	26.12.2023	Reporting Date:	27.12.2023
Source:	Ambient Air Gases	Monitoring Instrument:	[illegible]
GPS Coordinates:	34.5' 0757, 73.4' 7528		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m³)	(µg/m³)	(ppm²)	(µg/m³)
1	09:00 A.M	0.81	14.46	17.09	16.77
2	10:00 A.M	0.83	14.21	17.50	16.04
3	11:00 A.M	0.60	14.56	16.13	15.01
4	12:00 P.M	0.80	15.33	17.34	15.72
4	01:00 P.M	0.8	14.73	16.51	16.34
6	02:00 P.M	0.80	14.91	17.59	15.27
7	03:00 P.M	0.81	15.45	17.38	15.84
8	04:00 P.M	0.83	15.76	17.53	17.05
9	05:00 P.M	0.48	15.79	17.89	16.91
10	06:00 P.M	0.84	15.69	17.17	15.4
11	07:00 P.M	0.3	11.3	17.75	16.53
12	08:00 P.M	0.82	14.83	16.89	16.4
13	09:00 P.M	0.45	15.11	17.39	16.07
14	10:00 P.M	0.81	15.13	17.14	15.73
15	11:00 P.M	0.8	13.26	17.07	16.88
16	12:00 A.M	0.82	14.41	17.22	16.89
17	01:00 A.M	0.82	14.54	16.78	15.73
18	02:00 A.M	0.41	15.76	16.80	15.6
19	03:00 A.M	0.48	15.62	16.8	15.38
20	04:00 A.M	0.49	14.75	16.83	15.89
21	05:00 A.M	0.82	14.55	16.84	16.69
22	06:00 A.M	0.80	14.09	16.26	15.22
23	07:00 A.M	0.81	14.83	16.58	16.55
24	08:00 A.M	0.47	14.07	17.11	16.39
Average Concentration		0.75	11.61	13.36	12.43
NEQSAA		05	40	80	120
WHO		03	—	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

Note:

- Selected measurement units were ug/m^3 & ppm^3 otherwise stated.
- The client is responsible for[illegible] usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Tel: +92 51 5202323 Cell: +92 3000091053 Email: [illegible]@ieltec.com www.ieltechnologies.com

Environmental Protection Agency (EPA-KPK) Certified

AMBIENT GASES MONITORING REPORT

Reference Number		Client Name	CGGC JV SBC
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Ada-3 (Kordan)
Monitoring Date:	Oct-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Ambient Air Gases 34.5132ES,73.3913E?	Monitoring Instrument:	A 3500 kit, Serial # 1313

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1	09:00 A.M	0.73	23.50	26.76	23.4
2	12:00 A.M	0.0	24.5	26.94	23.27
3	11:00 A.M	0.72	24.87	27.21	22.91
4	12:00 P.M	0.72	24.87	26.12	22.07
5	01:00 P.M	0.68	22.62	25.49	22.62
6	02:00 P.M	0.75	25.2	28.1	21.9
7	03:00 P.M	0.72	23.74	26.89	22.62
8	04:00 P.M	0.68	24.68	26.81	23.71
9	05:00 P.M	0.69	22.91	26.13	23.54
10	06:00 P.M	0.7	16.81	20.56	16.34
11	07:00 P.M	0.75	17.69	21.16	17.77
12	08:00 P.M	0.62	17.62	20.27	17.46
13	09:00 P.M	0.58	16.23	20.7	17.31
14	10:00 P.M	0.63	17.67	20.56	16.67
15	11:00 P.M	0.58	16.89	21.56	17.52
16	12:00 A.M	0.69	17.76	20.69	17.6
17	01:00 A.M	0.65	17.83	20.17	16.73
18	02:00 A.M	0.62	17.68	21.65	16.54
19	03:00 A.M	0.64	16.87	20.21	16.17
20	04:00 A.M	0.69	16.68	19.94	16.03
21	05:00 A.M	0.7	17.54	19.27	17
22	06:00 A.M	0.68	17.17	20.15	17.16
23	07:00 A.M	0.7	16.12	20.47	17.23
24	08:00 A.M	0.73	17.52	20.52	17.12
Average Concentration		0.68	20.21	22.68	18.18
NEQSAA		05	40	80	120
WHO		04	---	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Detected measurement units were µg/m³ & mg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Lead Monitoring

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-PAK) Certified

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Power House (WAPDA)
Monitoring Date:	07-10-2023	Reporting Date:	17-10-2023
Source:	Ambient Air Gases	Monitoring Instrument:	AQM3 01, Serial # 1315
GPS Coordinates:	34.931812, 73.377115		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	From	(mgm^3)	(µgm^3)	(µgm^3)	(µgm^3)
1.	07:00 A.M	0.57	19.35	27.67	28.51
2.	10:00 A.M	0.62	19.2	27.00	26.50
3.	11:05 A.M	0.54	19.77	23.42	16.85
4.	12:00 P.M	0.65	20.51	27.71	18.79
5.	01:00 P.M	0.69	19.13	20.1	15.03
6.	02:00 P.M	0.57	19.6	22.81	16.81
7.	03:00 P.M	0.55	20.14	22.97	19.83
8.	04:00 P.M	0.6	19.39	23.72	20.42
9.	05:06 P.M	0.48	19.84	22.83	16.63
10.	06:00 P.M	0.4	19	19.87	14.38
11.	07:00 A.M	0.28	16.79	20.25	15.67
12.	08:00 A.M	0.33	17.11	19.36	16.68
13.	09:00 A.M	0.28	17.09	18.76	15.03
14.	10:00 A.M	0.33	16.3	19.64	13.71
15.	11:00 A.M	0.28	16.77	20.47	15.55
16.	12:00 A.M	0.26	16.09	19.72	16.68
17.	01:00 A.M	0.23	17.07	19.26	14.77
18.	02:00 A.M	0.23	16.27	19.02	14.59
19.	03:00 A.M	0.24	16.05	19.3	14.58
20.	04:00 A.M	0.24	17.27	19.03	14.67
21.	05:00 A.M	0.4	17.03	19.36	15.34
22.	06:00 A.M	0.36	16.05	19.22	15.7
23.	07:00 A.M	0.4	17.31	19.01	15.49
24.	08:00 A.M	0.43	16.58	19.01	15.36
Average Concentration		0.42	17.27	20.66	16.88
NEQSAA		05	40	80	120
WHO		04	—	20	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µgm^3 & mgm^3 otherwise stated.
- The client is responsible lawful usage of recorded data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No.05, Wah Cantt, Rawat, Attock Cable, Attock Road, Peshawar, Pakistan

Tel: +92 51 2031333 Cell: +92 3009810063 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA) KPK Certified

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Tehsil Balakot Upstream
Monitoring Date:	25-12-2023	Reporting Date:	27-12-2023
Source:	Ambient Air Gases	Monitoring Instrument:	AQMS GS Series # 1300
GPS Coordinates:	34.550388, 73.374513		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1.	09:00 A.M	0.36	6.7	10.01	10.81
2.	10:00 A.M	0.37	10.36	11.27	9.8
3.	11:00 A.M	0.39	10.02	11.10	7.89
4.	12:00 P.M	0.34	9.97	10.12	6.81
5.	01:00 P.M	0.36	11.46	12.15	9.81
6.	02:00 P.M	0.36	11.21	12.02	8.25
7.	03:00 P.M	0.37	10.55	11.72	6.65
8.	04:00 P.M	0.35	10.04	11.06	7.5
9.	05:00 P.M	0.22	6.19	6.41	7.55
10.	06:00 P.M	0.23	7.1	6.79	8.48
11.	07:00 P.M	0.24	7.31	10.43	8.97
12.	08:00 P.M	0.25	7.98	10.18	6.27
13.	09:00 P.M	0.22	7	6.13	6.83
14.	10:00 P.M	0.21	6.87	9.12	8.91
15.	11:00 P.M	0.23	7.15	6.41	8.29
16.	12:00 A.M	0.24	6.97	9.42	2.84
17.	01:00 A.M	0.25	7.31	9.41	5.24
18.	02:00 A.M	0.27	8.31	9.13	5.45
19.	03:00 A.M	0.21	6.13	5.45	5.64
20.	04:00 A.M	0.2	6.03	6.79	5.87
21.	05:00 A.M	0.21	6.11	9.13	5.27
22.	06:00 A.M	0.19	7.3	5.78	5.43
23.	07:00 A.M	0.2	7.01	5.73	5.64
24.	08:00 A.M	0.21	6.13	9.09	5.15
Average Concentration:		0.28	8.57	10.25	6.85
NEQSAA		05	40	80	120
WHO		04	—	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³ in grid otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Chief Executive

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 03, Main Cantt Road, Khattak Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 2302323 Cell: +92 300039 [illegible] Email: [illegible] www.iel-[illegible].com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number	M-HYDEMA/71-2023	Date from	03/10/2023
Project Name	Balakot Hydropower Project (300 MW)	Monitoring Location	CHQ Camp Office (Sunshine)
Monitoring Date	03-10-2023	Reporting Date	17-10-2023
Source/ GPS Coordinates	Ambient Air Cases 34.564032, 73.373878	Monitoring Instrument	AQM65 BK Scout 4 1370

Sr. No	Time	Parameters			
		CO	HC	NO_x	SO_2
		Levels			
	Hours	(mg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1.	04:00 A.M	0.40	7.23	9.54	10.17
2.	10:00 A.M	0.48	8.14	9.1	7.06
3.	11:00 A.M	0.5	8.68	13.19	7.61
4.	12:00 P.M	0.45	7.21	10.9	6.37
5.	01:00 P.M	0.47	9.11	11.05	6.62
6.	02:00 P.M	0.48	8.17	11.05	7.81
7.	03:00 P.M	0.46	9.47	10.22	6.27
8.	04:00 P.M	0.45	8.87	10.19	7.05
9.	05:00 P.M	0.49	8.39	7.98	7.11
10.	06:00 P.M	0.48	7.63	8.23	7.05
11.	07:00 P.M	0.47	7.60	8.9	7.34
12.	08:00 P.M	0.46	8.11	8.05	6.89
13.	09:00 P.M	0.46	7.15	7.84	7.5
14.	10:00 P.M	0.46	7.15	7.03	7.1
15.	11:00 P.M	0.46	7.24	7.06	6.87
16.	12:00 A.M	0.47	7.13	8.15	6.45
17.	01:00 A.M	0.49	7.28	7.91	6.81
18.	02:00 A.M	0.45	8.40	7.05	7.09
19.	03:00 A.M	0.44	8.24	7.09	6.71
20.	04:00 A.M	0.45	8.24	7.46	6.54
21.	05:00 A.M	0.44	8.63	7.05	6.84
22.	06:00 A.M	0.43	7.43	7.47	6
23.	07:00 A.M	0.43	7.57	7.3	6.71
24.	08:00 A.M	0.44	8.34	7.55	6.95
Average Current Monitor		0.46	7.93	8.77	7.04
NDSRAA		30	10	80	120
WHO		30	—	30	40

NEQSAA: National Environmental Quality Standards for Ambient Air

WHO: World Health Organization

Note:

a. Ambient air quality values µg/m³, mg/m³ & ppm as stated

b. The result is based on hourly readings of respective data on hourly

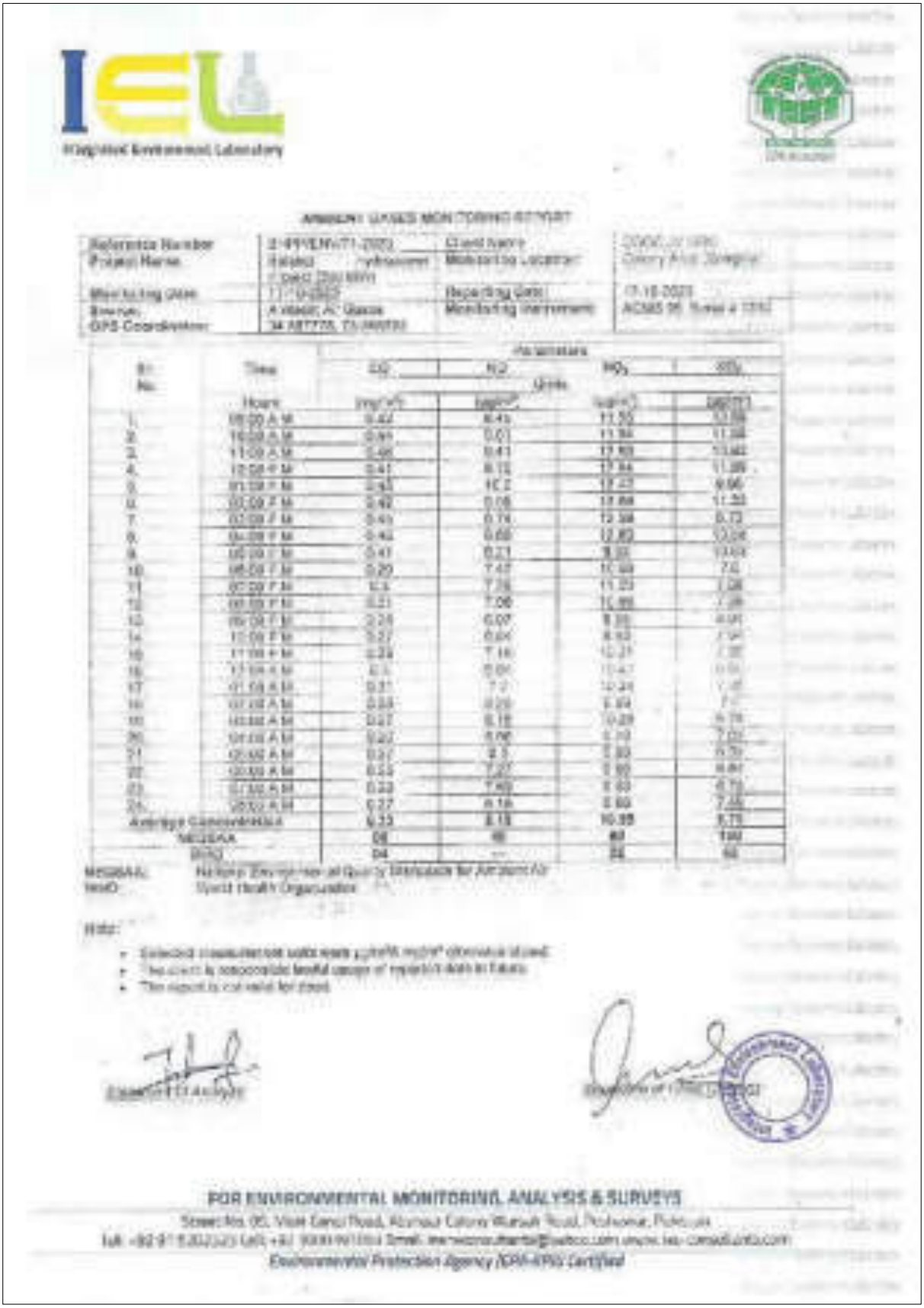
c. The report is not valid for court

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Shop No. 09, Main Canal Road, Abubakar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5302323 Cell: +92 3005091053 E-mail: iamcomsat.tanda@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA) KPK Certified



Integrated Environment Laboratory

ANNEXURE-I: GASES MONITORING REPORT

Reference Number		Client Name	
Project Name		Monitoring Location	
Monitoring Date		Reporting Date	
Remark		Monitoring Instrument	
GPS Coordinates			

Sr. No.	Time	Parameters			
		CO	NO_2	NO_x	SO_2
		Units			
	Hours				
1.	08:00 A.M	0.42	8.41	11.55	
2.	10:00 A.M	0.51	0.01	11.94	
3.	11:00 A.M	0.46	0.41	11.83	
4.	12:00 P.M	0.41	8.15	11.84	
5.	01:00 P.M	0.43	10.2	12.43	9.66
6.	02:00 P.M	0.42	0.16	11.88	11.50
7.	03:00 P.M	0.45	0.74	12.38	8.73
8.	04:00 P.M	0.42	0.60	12.82	
9.	05:00 P.M	0.41	0.21	9.33	
10.	06:00 P.M	0.20	7.47	10.68	7.0
11.	07:00 P.M	0.3	7.76	11.23	7.08
12.	08:00 P.M	0.21	7.06	10.99	7.09
13.	09:00 P.M	0.24	0.07	9.33	6.91
14.	10:00 P.M	0.27	0.04	8.53	7.04
15.	11:00 P.M	0.24	7.16	10.21	7.07
16.	12:00 A.M	0.3	6.94	10.47	6.93
17.	01:00 A.M	0.31	7.2	10.24	7.07
18.	02:00 A.M	0.23	0.03	8.64	7.0
19.	03:00 A.M	0.27	0.15	9.29	6.78
20.	04:00 A.M	0.22	6.96	9.72	7.01
21.	05:00 A.M	0.27	6.9	9.93	6.79
22.	06:00 A.M	0.24	7.07	9.95	6.91
23.	07:00 A.M	0.23	7.03	9.93	6.79
24.	08:00 A.M	0.27	6.16	8.93	7.05
Average Concentration		0.33	3.13	10.35	8.75
NEQSAA		08	40	80	120
WHO		04	---	04	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Detection limit is not valid for blank.

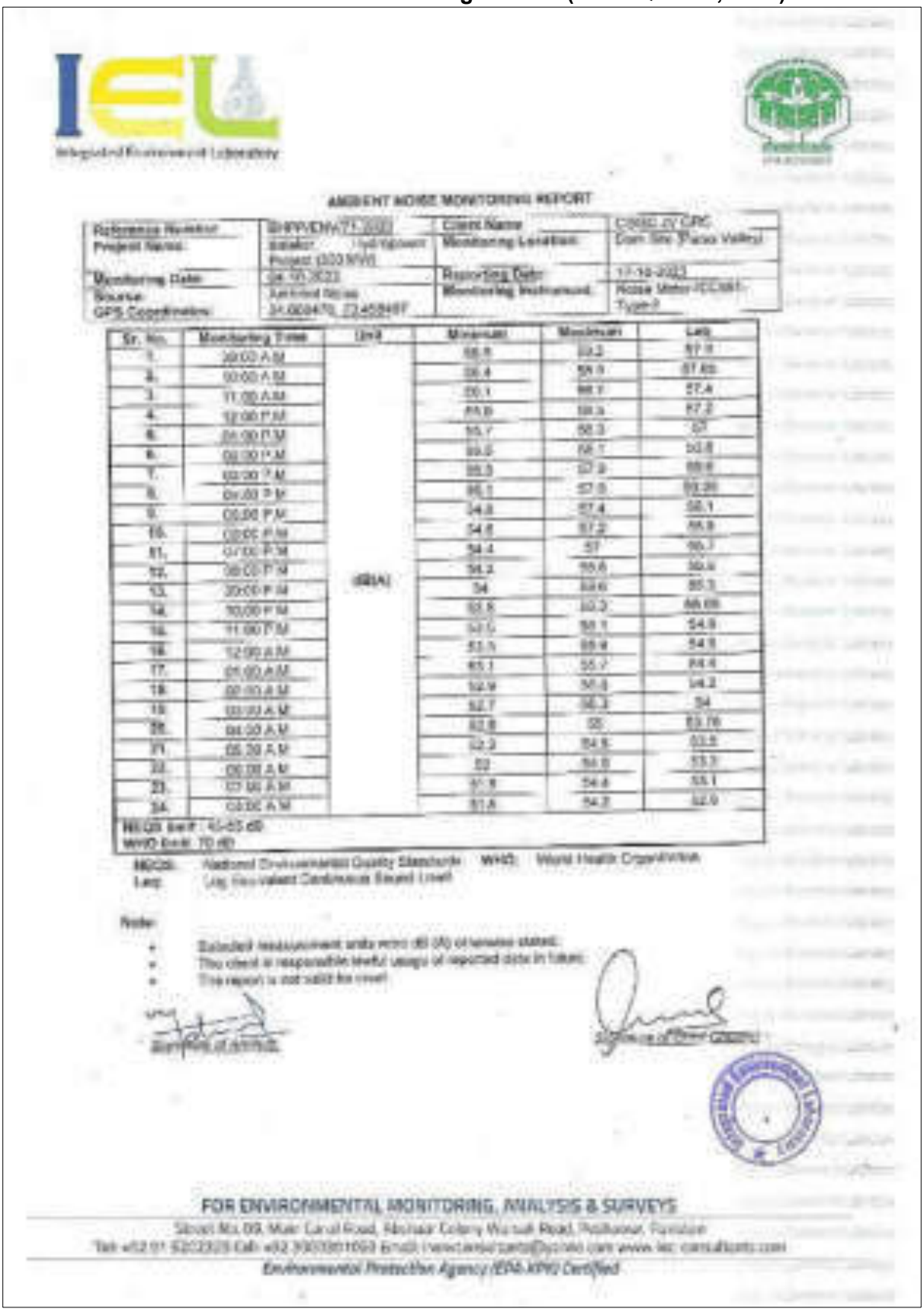
FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Wasi Ganj Road, Ahmad Colony Warsak Road, Peshawar, Pakistan

Cell: +92-91-5302323 Cell: +92-3039761554 Email: iel.consultants@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Ambient Noise Level Monitoring Results (Third Quarter, 2023)



AMBIENT NOISE MONITORING REPORT

Reference Number:	BHPVEN/[illegible]	Client Name:	[illegible] JV GRC
Project Name:	[illegible] Hydropower Project (300 MW)	Monitoring Location:	Dam Site Palas Valley
Monitoring Date:	04.10.2023	Reporting Date:	17-10-2023
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter (CC-361, Type-I)
GPS Coordinates:	34.6084°N, 73.4584°E		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:00 A.M	dB(A)	55.5	59.3	57.1
2.	00:00 A.M		56.4	59.1	57.65
3.	11:00 A.M		55.1	58.1	57.4
4.	12:00 P.M		55.9	58.5	57.2
5.	01:00 P.M		55.7	58.3	57
6.	02:00 P.M		55.5	58.1	56.8
7.	03:00 P.M		55.3	57.9	56.6
8.	04:00 P.M		55.1	57.5	56.25
9.	05:00 P.M		54.8	57.4	56.1
10.	06:00 P.M		54.6	57.2	55.9
11.	07:00 P.M		54.4	57	55.7
12.	08:00 P.M		54.2	55.6	55.4
13.	09:00 P.M		54	55.6	55.3
14.	10:00 P.M		53.8	55.3	55.05
15.	11:00 P.M		53.6	55.1	54.9
16.	12:00 A.M		53.5	55.4	54.9
17.	01:00 A.M		53.1	55.2	54.8
18.	02:00 A.M		52.9	54.8	54.2
19.	03:00 A.M		52.7	54.3	54
20.	04:00 A.M		52.6	55	53.75
21.	05:00 A.M		52.3	54.5	53.5
22.	06:00 A.M		52	54.0	53.3
23.	07:00 A.M		51.9	54.4	53.1
24.	08:00 A.M		51.8	54.2	52.9

NEQS limit: 45-65 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Recorded measurement units were dB (A) unless stated.
- The client is responsible lawful usages of reported data in future.
- This report is not valid for court

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Nishtar Colony Wu suk Road, Peshawar, Pakistan

Tel: +92 91 5212329 Cell: +92 3003801093 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Ac >1 (Trees)
Monitoring Date:	09-11-2023	Reporting Date:	17-11-2023
Source: GPS Coordinates:	Ambient Noise 34.539139, 73.429691	Monitoring Instrument:	Lutron Model-SD805 Type-II

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1	06:30 A.M	dB(A)	60.9	66.2	63.79
2	12:30 A.M		62.1	68	63.84
3	1:30 A.M		61.0	64.5	63.30
4	2:30 A.M		61.7	64.0	63.1
5	03:30 A.M		61.5	64.2	63.2
6	04:30 A.M		61.7	64.1	63.83
7	05:30 A.M		61	63.9	[illegible]
8	06:30 A.M		62.0	63.7	62.83
9	07:30 A.M		54.5	61.2	58.79
10	08:30 A.M		56.1	57	56.63
11	09:30 A.M		55.8	56.7	56.3
12	10:30 A.M		55.6	56.8	55.69
13	11:30 A.M		55.4	55.9	54.85
14	12:30 P.M		55.3	55.9	54.62
15	01:30 P.M		55	55.8	54.49
16	02:30 P.M		52.8	55.7	54.38
17	03:30 P.M		52.6	55.5	54.25
18	04:30 P.M		52.5	55.3	53.65
19	05:30 P.M		52.2	55.1	53.55
20	06:30 P.M		50	54.8	53.4
21	07:30 P.M		51.7	54.3	53.15
22	08:30 P.M		51.5	54.4	52.95
23	09:30 P.M		50.4	54.8	53.3
24	10:30 P.M		49.7	53.2	51.75

NEQS limit: 40 to 55 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standard WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Statistical inconsistent with mean (X) otherwise stated.
- The unit is to compare with future range of reporting data in future.
- The report is not valid for court.

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-JKM) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	IEL/[illegible]/2023	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	[illegible]
Monitoring Date:	05-12-2023	Reporting Date:	[illegible]
Source:	Ambient Noise	Monitoring Instrument:	Type 2
GPS Coordinates:	[illegible]		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	[illegible] A.M	dB(A)	[illegible]	[illegible]	[illegible]
2.	[illegible] A.M		[illegible]	[illegible]	[illegible]
3.	[illegible] A.M		[illegible]	[illegible]	[illegible]
4.	[illegible] P.M		[illegible]	[illegible]	[illegible]
5.	[illegible] P.M		[illegible]	[illegible]	[illegible]
6.	[illegible] P.M		[illegible]	[illegible]	[illegible]
7.	[illegible] P.M		[illegible]	[illegible]	[illegible]
8.	[illegible] P.M		[illegible]	[illegible]	[illegible]
9.	[illegible] P.M		[illegible]	[illegible]	[illegible]
10.	[illegible] P.M		[illegible]	[illegible]	[illegible]
11.	[illegible] P.M		[illegible]	[illegible]	[illegible]
12.	[illegible] P.M		[illegible]	[illegible]	[illegible]
13.	[illegible] P.M		[illegible]	[illegible]	[illegible]
14.	[illegible] P.M		[illegible]	[illegible]	[illegible]
15.	[illegible] P.M		[illegible]	[illegible]	[illegible]
16.	[illegible] A.M		[illegible]	[illegible]	[illegible]
17.	[illegible] A.M		[illegible]	[illegible]	[illegible]
18.	[illegible] A.M		[illegible]	[illegible]	[illegible]
19.	[illegible] A.M		[illegible]	[illegible]	[illegible]
20.	[illegible] A.M		[illegible]	[illegible]	[illegible]
21.	[illegible] A.M		[illegible]	[illegible]	[illegible]
22.	[illegible] A.M		[illegible]	[illegible]	[illegible]
23.	[illegible] A.M		[illegible]	[illegible]	[illegible]
24.	[illegible] A.M		[illegible]	[illegible]	[illegible]

NEQS limit: [illegible] dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) at nonlinear status.
- The client is responsible for[illegible] usage of reported data in future.
- The month is not valid for court.

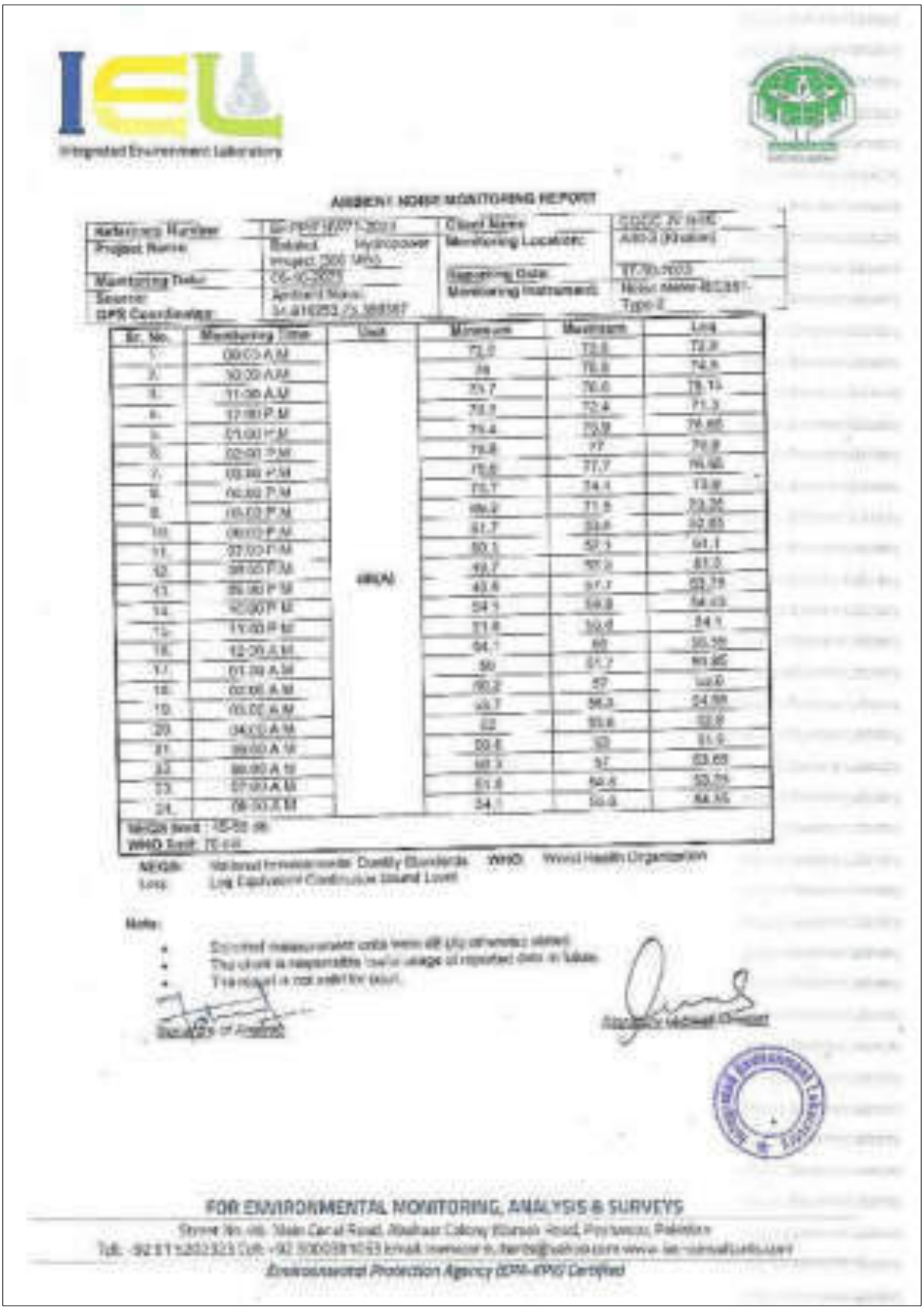
[illegible]
Technical Analyst

[illegible]
Authorized Signatory

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-EPR) Certified



Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number		Client Name	
Project Name	Balakot Hydropower Project (300 MW)	Monitoring Location	
Monitoring Date		Sampling Date	
Source		Monitoring Instrument	
GPS Coordinates			

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	08:00 A.M	dB(A)			
2.	10:00 A.M				
3.	11:00 A.M				
4.	12:00 P.M				
5.	01:00 P.M				
6.	02:00 P.M				
7.	03:00 P.M				
8.	06:00 P.M				
9.	08:00 P.M				
10.	09:00 P.M				
11.	10:00 P.M				
12.	08:00 P.M				
13.	06:00 P.M				
14.	12:00 P.M				
15.	11:00 P.M				
16.	12:00 A.M				
17.	01:00 A.M				
18.	02:00 A.M				
19.	03:00 A.M				
20.	04:00 A.M				
21.	05:00 A.M				
22.	06:00 A.M				
23.	07:00 A.M				
24.	08:00 A.M				

NEQS limit : 85 dB (A)
WHO limit : 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Standard measurement units were dB (A) otherwise stated.
- The client is responsible for the usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Authority Manager / Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 06, Main Canal Road, Shalimar Colony, Warsak Road, Peshawar, Pakistan
Tel: +92 91 5202323 Cell: +92 3000981033 E-mail: [illegible]
Environmental Protection Agency (EPA-KPK) Certified

AMBIENT NOISE MONITORING REPORT

Reference Number:	SEPS/CR/071-2023	Client Name:	CSMC-JV GHC
Project Name:	Selcuk Hydropower Project (300 MW)	Monitoring Location:	Powerhouse (Balkot)
Monitoring Date:	27-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Ambient Noise: 34.601913, 73.377145	Monitoring Instrument:	Noise Meter IEC651-Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	58.3	60.3	60.75
2.	10:00 A.M		59.1	62	60.59
3.	11:00 A.M		59.8	61.8	60.9x
4.	12:00 P.M		59.1	61.0	60.15
5.	01:00 P.M		58.2	61.3	59.85
6.	02:00 P.M		58.5	61.1	59.65
7.	03:00 P.M		56	60.9	58.50
8.	04:00 P.M		57.9	60.7	59.20
9.	05:00 P.M		57.0	60.3	59.03
10.	06:00 P.M		44.4	47.3	45.05
11.	07:00 P.M		44.1	47	45.15
12.	08:00 P.M		43.9	46.5	45.0x
13.	09:00 P.M		43.7	46.0	44.1x
14.	10:00 P.M		43.5	46.4	44.05
15.	11:00 P.M		43.3	46.2	44.0x
16.	12:00 A.M		43	45.8	44.45
17.	01:00 A.M		42.8	45.7	44.25
18.	02:00 A.M		42.9	45.6	44.35
19.	03:00 A.M		42.6	45.3	43.95
20.	04:00 A.M		42.2	45	43.6
21.	05:00 A.M		41.9	44.8	43.35
22.	06:00 A.M		41.7	44.6	43.15
23.	07:00 A.M		39.8	43.4	41.6
24.	08:00 A.M		40	42.8	41.4

NEQS limit: 75 dB
WHO Limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Long Equivalent Continuous Sound Level

Note:

- Subjected recommendations were as it is otherwise stated.
- The client is responsible lawful usage of reported data in future.
- The report is not admissible in court.

Signature of Analyst

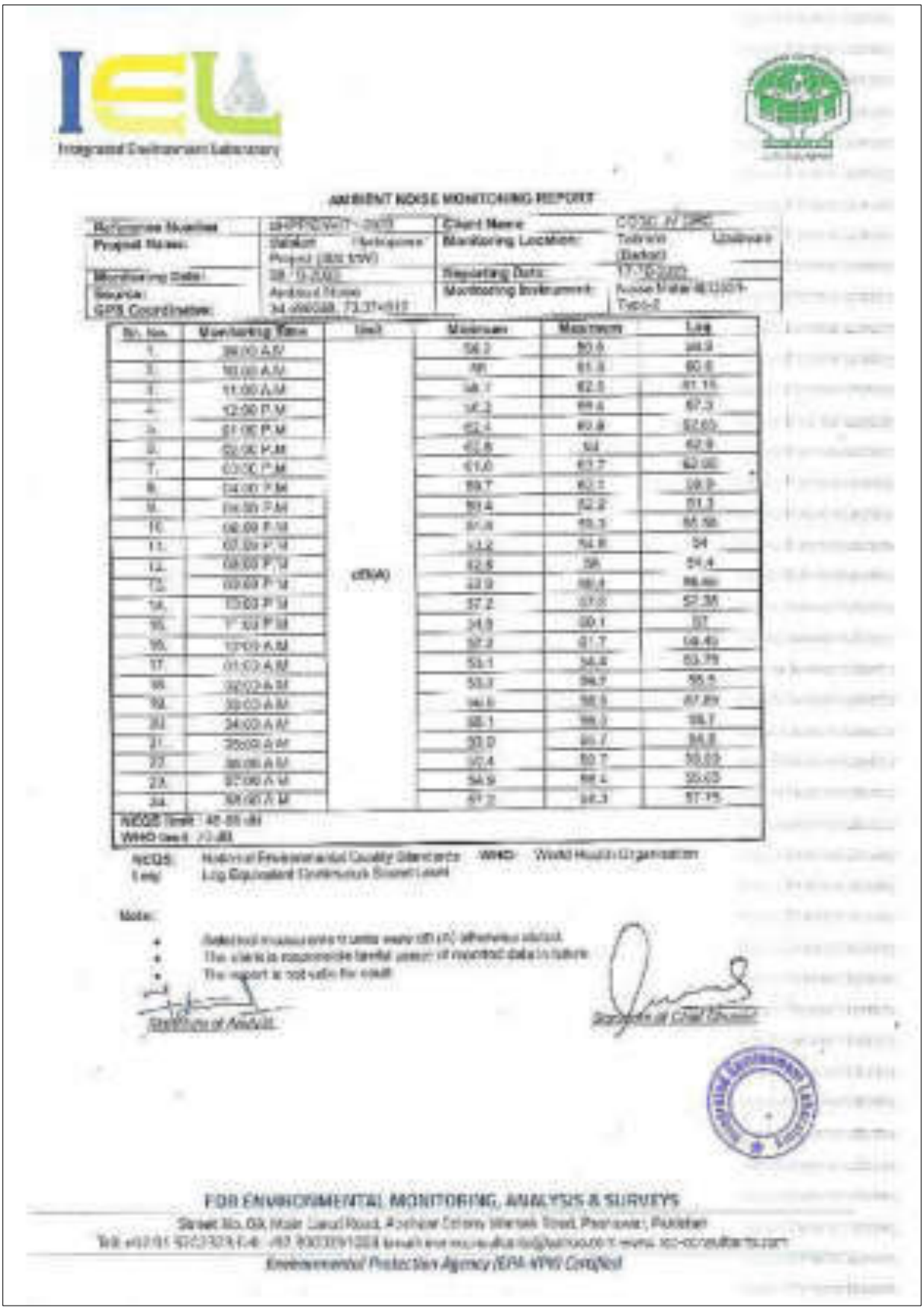
Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No.3, GB Main Canal Road, Abbottabad Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5252324 Cell: +92 3000 [illegible] Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Tehsil Ussehara (Balkot)
Monitoring Date:	28-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Ambient Noise 34.[illegible] 73.37+513	Monitoring Instrument:	Noise Meter 4(1)SA Type-I

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	56.2	80.6	66.9
2.	10:00 A.M		58	81.3	80.6
3.	11:00 A.M		58.7	82.5	81.15
4.	12:00 P.M		54.3	69.6	67.3
5.	01:00 P.M		60.4	80.8	80.60
6.	02:00 P.M		47.8	64	62.9
7.	03:00 P.M		61.0	83.7	82.00
8.	04:00 P.M		59.7	80.1	68.9
9.	05:00 P.M		59.4	82.8	81.3
10.	06:00 P.M		61.8	83.3	81.56
11.	07:00 P.M		53.2	54.8	54
12.	08:00 P.M		52.6	58	54.4
13.	09:00 P.M		43.9	66.4	66.40
14.	10:00 P.M		57.2	81.0	57.38
15.	11:00 P.M		34.9	80.1	67
16.	12:00 A.M		52.3	81.7	68.49
17.	01:00 A.M		53.1	56.8	53.79
18.	02:00 A.M		53.3	84.7	55.5
19.	03:00 A.M		56.6	98.5	67.89
20.	04:00 A.M		68.1	99.3	68.7
21.	05:00 A.M		33.0	80.7	34.8
22.	06:00 A.M		52.4	80.7	53.03
23.	07:00 A.M		54.9	68.4	55.03
24.	08:00 A.M		47.2	68.3	57.75

NEQS limit: 45-55 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurements in units were dB (A) otherwise stated.
- The client is responsible [illegible] of incorrect data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 04, Main Jamrud Road, Peshawar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5273329, Fax: +92 9033391208, [illegible]

Environmental Protection Agency (EPA KPK) Compliant

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	IE: [illegible]/23-2023	Client Name:	[illegible]
Project Name:	Balakot 4x Hydropower Project (300 MW)	Monitoring Location:	[illegible] (Energas)
Monitoring Date:	16-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Ambient Noise 34.584802, 73.371079	Monitoring Instrument:	Noise Meter HS5681 Type 2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	55.6	66.2	57.9
2.	10:00 A.M		56.8	62.3	59.4
3.	11:00 A.M		58.3	61.2	60.78
4.	12:00 P.M		54.8	57	55.3
5.	01:00 P.M		61	61.8	61.26
6.	02:00 P.M		61.4	61.8	61.5
7.	03:00 P.M		60.2	62.3	61.26
8.	04:00 P.M		56.9	58.7	58.5
9.	05:00 P.M		54.3	60.1	56.2
10.	06:00 P.M		56.7	60.3	59.46
11.	07:00 P.M		57.1	61.7	61.0
12.	08:00 P.M		59.7	61.9	60.3
13.	09:00 P.M		56.5	58.3	57.66
14.	10:00 P.M		55.1	59.4	58.38
15.	11:00 P.M		59.8	60	59.9
16.	12:00 A.M		56.1	59.6	57.93
17.	01:00 A.M		61	62.3	61.65
18.	02:00 A.M		61.2	61.8	61.4
19.	03:00 A.M		54.7	56.2	55.75
20.	04:00 A.M		60	61.7	60.8
21.	05:00 A.M		57.6	60.6	59.7
22.	06:00 A.M		51.3	57.8	54.48
23.	07:00 A.M		56.9	61.4	59.1
24.	08:00 A.M		56.1	58.2	56.99

NEQS limit : 85 dB
WHO limit : 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Leq Equivalent Continuous Sound Level

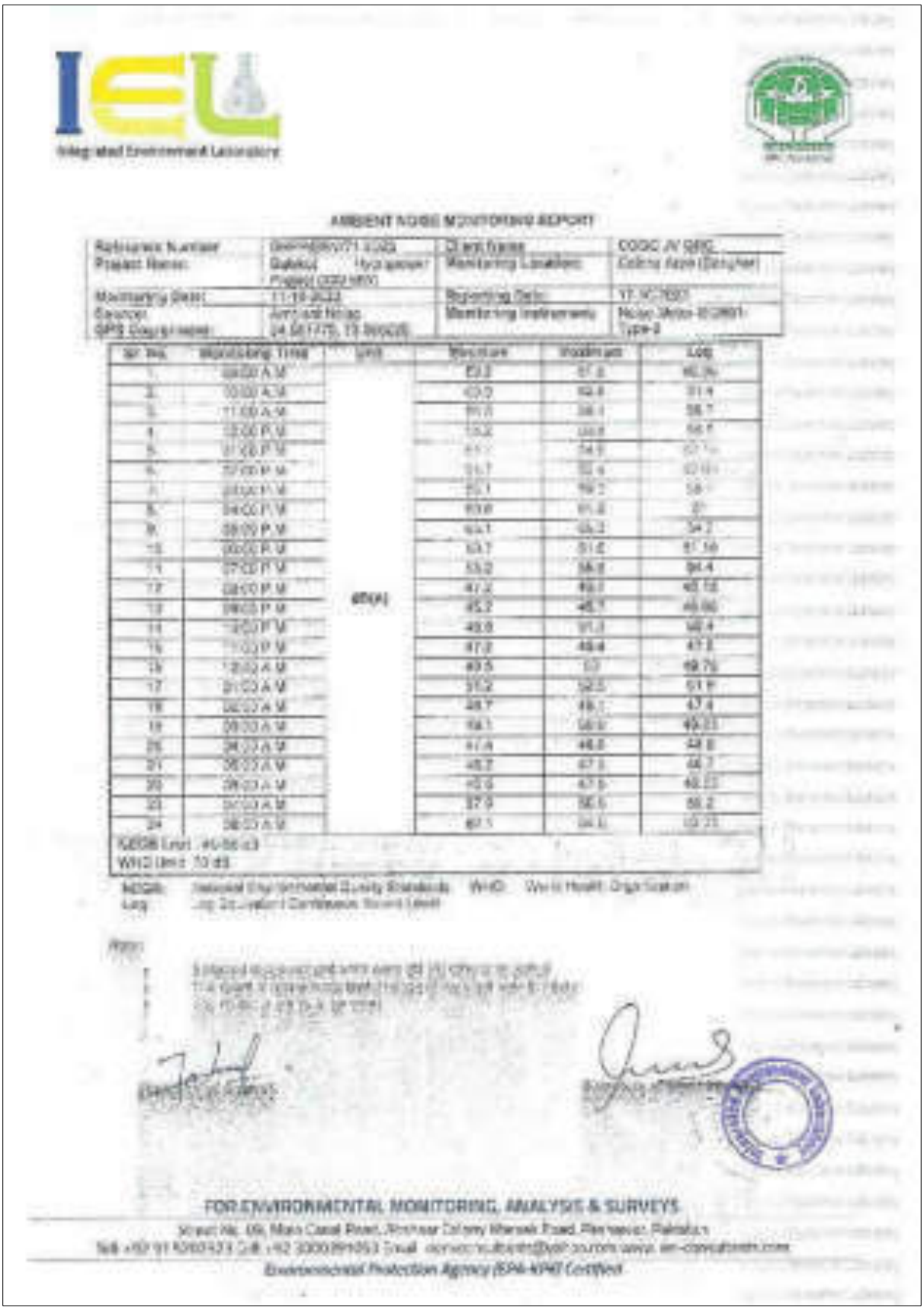
Note:

- Detected measurement [illegible]
- [illegible]
- [illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-KPK) Certified



AMBIENT NOISE MONITORING REPORT

Reference Number		Client Name	COGC JV SEC
Project Name	Balakot Hydropower Project (300 MW)	Monitoring Location	Colony Area (Dining Hall)
Monitoring Date	11-10-2023	Reporting Date	17-10-2023
Equipment	Avm and Nl-52	Monitoring Instrument	Noise Meter IEC651 Type-2
GPS Coordinates	34.561775, 73.360628		

Sr. No.	Monitoring Time	Unit	Maximum	Minimum	Leq
1	08:00 A.M	dB(A)	60.2	57.6	58.3
2	10:00 A.M		62.0	52.8	57.4
3	11:00 A.M		59.8	56.1	58.7
4	12:00 P.M		63.2	55.8	58.7
5	01:00 P.M		61.1	54.9	57.1
6	02:00 P.M		59.7	55.4	57.6
7	03:00 P.M		60.1	56.2	58.1
8	04:00 P.M		63.8	61.8	62.7
9	05:00 P.M		64.1	60.2	62.2
10	06:00 P.M		63.7	61.6	61.16
11	07:00 P.M		63.2	58.8	60.4
12	08:00 P.M		61.2	59.1	60.18
13	09:00 P.M		65.2	60.1	60.66
14	10:00 P.M		63.8	61.3	62.4
15	11:00 P.M		61.2	59.4	61.2
16	12:00 A.M		63.5	60	60.76
17	01:00 A.M		59.2	58.5	61.9
18	02:00 A.M		58.7	56.1	57.4
19	03:00 A.M		59.1	58.9	59.03
20	04:00 A.M		61.6	58.8	59.8
21	05:00 A.M		58.2	57.1	58.7
22	06:00 A.M		60.8	57.5	59.03
23	07:00 A.M		57.9	56.5	56.2
24	08:00 A.M		60.1	58.1	59.23

NEQS Limit : 65-55 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Khasra No. 09, Main Canal Road, Peshawar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5760423 Cell: +92 3009891053 Email: ...
Environmental Protection Agency (EPA-KPK) Certified

Drinking Water Monitoring Results (Third Quarter, 2023)

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name	Balakot Hydropower Project (300 MW)	Sampling Location	Dam Site (Forest Valley)
Sampling Date	[illegible]	Reporting Date	17.10.2023
Source/ GPS Coordinates	Spring Water (Source) 34.553167, 73.119078	Analysis Method	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	APHA-4500H+ B	-	6.5-8.5	6.5-8.5	7.3
2.	Temperature	—	°C	—	—	8
3.	Taste & Odor	In-House	-	Non-Objectionable	Non Objectionable	Non Objectionable
4.	Color	APHA-2120 B/C	TCU	<15	<15	2
5.	Turbidity	APHA-2130 B	NTU	<5	<5	2.1
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	359
7.	Total Hardness as $CaCO_3$	APHA 2340 C	mg/l	——	<500	239
8.	Nitrate (NO_3)	APHA-4500NO3- B	mg/L	50	100	0.09
9.	Nitrite (NO_2)	APHA-4500NO2- B	mg/L	3	<3	0.004
10.	Arsenic (As)	APHA-3500As B	mg/L	0.01	40.03	N.D.
11.	Nickel (Ni)	ASTM D 3867 B	mg/L	0.02	<0.02	N.D.
12.	Antimony (Sb)	APHA-3500Sb B	mg/L	0.005	<0.005	N.D.
13.	Chloride (Cl)	APHA-4500Cl- B	mg/L	250	<250	65.4
14.	Chlorine	APHA-4500 CL	mg/L		0.5-1.5	0.02
15.	Lead (Pb)	APHA-3500 Pb-B	mg/L	0.01	40.03	N.D
16.	Fluoride	APHA-4500F- C	mg/L	1.5	<1.5	0.47
17.	Aluminum	APHA-3500 Al	mg/L	0-0.2	<0.2	N.D.
18.	Manganese (Mn)	APHA-3500 Mn- B	mg/L	0.5	<0.5	N.D
19.	Cadmium (Cd)	APHA-3500 Cd-B	mg/l	0.003	0.01	N.D.
20.	Barium (Ba)	APHA-3500 Ba B	mg/l	0.3	0.7	0.045
21.	Mercury (Hg)	APHA-3500 Hg-B	mg/L	0.001	40.001	N.D
22.	Copper (Cu)	APHA- 3500 Cu-B	mg/L	2	2	0.06
23.	Zinc (Zn)	APHA- 3500 Zn-B	mg/L	3	3	1.14
24.	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	40.05	N.D.
26.	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN)	APHA 4500 CN	mg/l	0.07	40.05	N.D.
28.	E-Coli	APHA [illegible]	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	Total Coliform	APHA 9222 B	Number/100 ml	Must not be detectable in any 100 ml sample	0 Number/100 ml	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
N.D: Not Detected

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Khyber Dana Road, Khattak Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5202323 Cell: +92 3030 [illegible] Email: [illegible] www.iel-pakistan.com

Environmental Protection Agency (EPA 4750) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	BHPREMW71-2023	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Tham Bin (Pehro Valley)
Sampling Date:	11-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Tap Water (End User) [illegible]	Analysis Method:	APHA/USEPA Standard Methods

Sr No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	APHA 4500-H+ B	--	6.5-8.5	6.5-8.5	7.6
2.	Temperature	---	°C	--	---	11
3.	Taste & Odor	Refrigerator	--	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA 2120 B/C	TCU	≤ 15	<15	4
5.	Turbidity	APHA 2130 B	NTU	<5	<5	3.8
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	< 1000	<1000	367
7.	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	271
8.	Nitrate (NO_3)	APHA 4500NO3 B	mg/L	50	≤50	1.04
9.	Nitrite (NO_2)	APHA 4500NO2 B	mg/L	3	≤3	0.003
10.	Arsenic (As)	APHA 3500As B	mg/L	0.01	≤0.05	N.D.
11.	Nickel (Ni)	AOAC 974.27	mg/L	0.02	≤0.02	N.D.
12.	Antimony (Sb)	APHA 3500Sb B	mg/L	0.005	<0.005	N.D.
13.	Chloride (Cl)	APHA 4500Cl- B	mg/L	250	<250	93.6
14.	Cyanide	APHA 4500 CN	mg/L		0.5-1.5	0.47
15.	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA 4500F- C	mg/L	1.5	≤1.5	0.41
17.	Aluminum	APHA 3500 Al	mg/L	0.03	≤0.2	N.D.
18.	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.4	≤0.5	N.D.
19.	Cadmium (Cd)	APHA 3500 Cd B	mg/L	0.003	≤0.01	N.D.
20.	Barium (Ba)	APHA 3500 Ba B	mg/L	0.3	0.7	0.11
21.	Mercury (Hg)	APHA 3500 Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA 3500 Cu B	mg/L	2	2	0.19
23.	Zinc (Zn)	APHA 3500 Zn B	mg/L	3	5	1.23
24.	Boron (B)	APHA 4500 B- C	mg/l	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA 3500 Se C	mg/L	0.01	≤0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D.
28.	E-Coli	APHA 9222 D	Number/100 ml	Must not be detectable in any 100 ml sample	0 Number/100 ml	0
29.	Total Coliform	APHA 9222 D	Number/100 ml	Must not be detectable in any 100 ml sample	0 Number/100 ml	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization

N.D: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Afridi Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202325 Cell: +92 3339 [illegible] Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	[illegible]
Sampling Date:	[illegible]	Reporting Date:	[illegible]
Source:	[illegible]	Analysis Method:	[illegible]
GPS Coordinates:	[illegible]		

Sr. No.	Parameters	Standard Methods	Units	WHO	NSWQS	Results
1.	pH	[illegible]	-	[illegible]	[illegible]	[illegible]
2.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.	[illegible] & Odor	[illegible]	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28.	[illegible]	[illegible]	[illegible]	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	[illegible]	[illegible]	[illegible]	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

[illegible] Analytical Limits / Water Quality Standards [illegible] World Health Organization

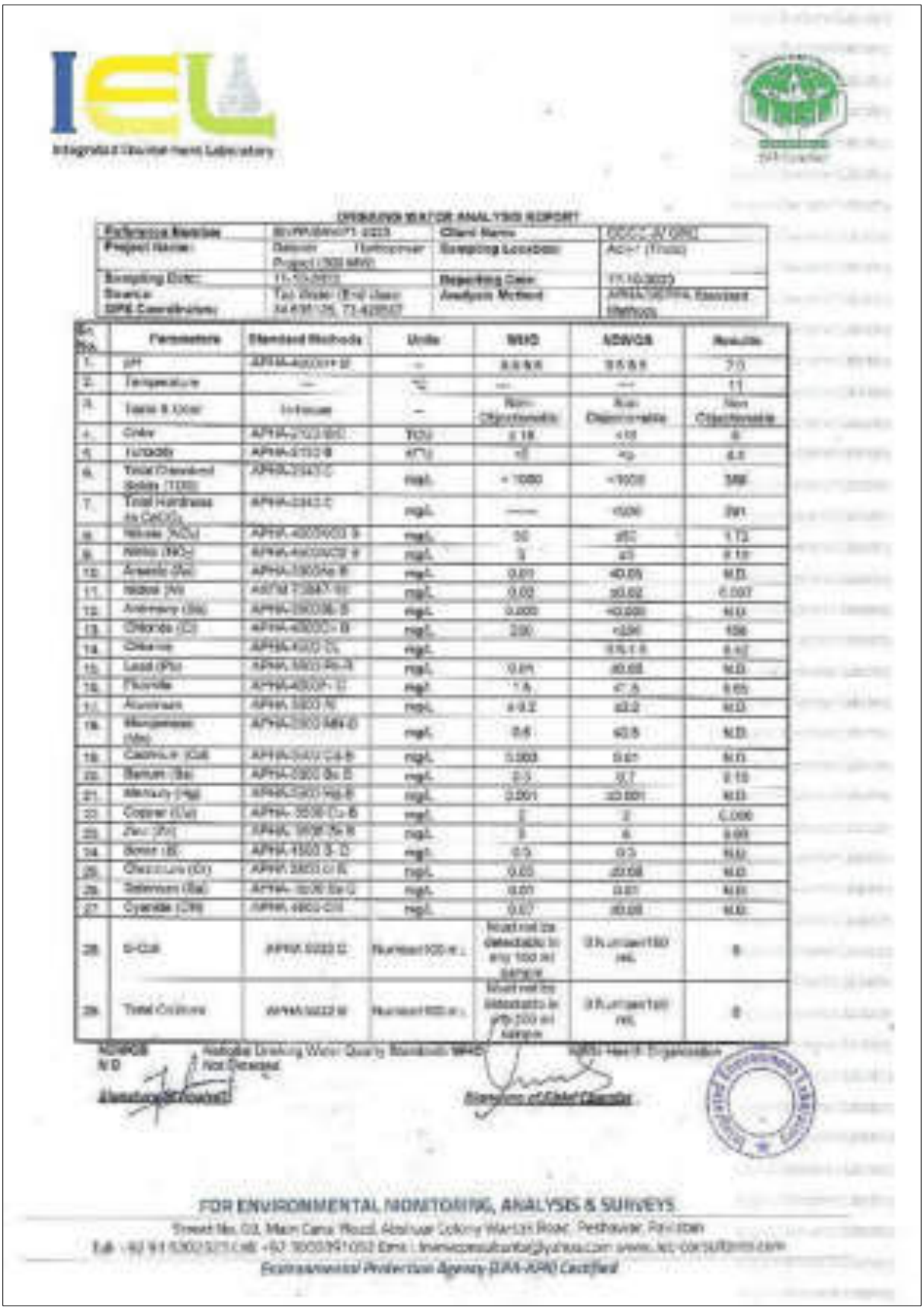
[illegible] Analyst

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-KP) Certified



Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name	Dasu Hydropower Project (300 MW)	Sampling Location	Acre (Trunk)
Sampling Date	11-10-2023	Reporting Date	17-10-2023
Source GPS Coordinates	Tail Water (End Dam) 34.491126, 73.429537	Analysis Method	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NSDWQS	Results
1.	pH	APHA 4500-H+ B	-	6.5-8.5	6.5-8.5	7.0
2.	Temperature	-	°C	-	-	11
3.	Taste & Odor	Intrinsic	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA 2120 B	TCU	≤ 15	≤ 15	5
5.	Turbidity	APHA 2130 B	eNTU	≤5	≤5	4.5
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	388
7.	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	291
8.	Nitrate (NO_3)	APHA 4500-NO3- B	mg/L	50	≤50	1.72
9.	Nitrite (NO_2)	APHA 4500-NO2- B	mg/L	3	≤3	0.10
10.	Arsenic (As)	APHA 3500-As B	mg/L	0.01	≤0.05	N.D.
11.	Iodine (As)	ASTM 7340-B	mg/L	0.02	≤0.02	0.007
12.	Antimony (Sb)	APHA 3500-Sb B	mg/L	0.005	≤0.005	N.D.
13.	Chloride (Cl)	APHA 4500-Cl- B	mg/L	250	≤250	106
14.	Chlorine	APHA 4500-Cl-	mg/L		0.5-1.5	0.42
15.	Lead (Pb)	APHA 3500-Pb B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA 4500-F- D	mg/L	1.5	≤1.5	0.65
17.	Aluminum	APHA 3500-Al	mg/L	≤ 0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA 3500-Mn B	mg/L	0.4	≤0.5	N.D.
19.	Cadmium (Cd)	APHA 3500-Cd B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA 3500-Ba B	mg/L	0.3	0.7	0.10
21.	Mercury (Hg)	APHA 3500-Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA 3500-Cu B	mg/L	2	2	0.006
23.	Zinc (Zn)	APHA 3500-Zn B	mg/L	3	5	0.03
24.	Boron (B)	APHA 4500 B-C	mg/L	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA 3500-Cr B	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA 3500-Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D.
28.	E-Coli	APHA 9223 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 N. of per/100 mL	0
29.	Total Coliforms	APHA 9223 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 N. of per/100 mL	0

NSDWQS: National Drinking Water Quality Standards (WHO: World Health Organization)
N.D: Not Detected

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSES & SURVEYS

Street No. 03, Main Cantt Road, Abdullah Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5302171 Cell: +92 3005791053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-2 (Chainage)
Sampling Date:	[illegible]	Reporting Date:	07-10-2023
Source: GPS Coordinates:	Spring Water 34.816367, 73.117358	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1	pH	APHA-4500H+ B	-	6.5-8.5	6.5-8.5	7.8
2	Temperature	—	°C	—	—	8
3	Taste & Odor	[illegible]		Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Color	APHA-2120 B/C	TCU	≤15	≤15	4.7
5	Turbidity	APHA-2130 B	NTU	<5	<5	3.2
6	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	359
7	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	------	<500	243
8	Nitrate (NO_3)	APHA-4500NO3 B	mg/L	50	<50	3.66
9	Nitrite (NO_2)	APHA-4500NO2 B	mg/L	3	<3	0.89
10	Arsenic (As)	APHA-3500-As B	mg/L	0.01	<0.05	N.D.
11	Boron (B)	ASTM D3082-B	mg/L	0.03	<0.03	N.D.
12	Antimony (Sb)	APHA-3500Sb B	mg/L	0.005	<0.005	N.D.
13	Chloride (Cl)	APHA-4500Cl- B	mg/L	250	<250	108
14	Chlorine	APHA-4500-CL	mg/L		0.5-1.5	0.89
15	Lead (Pb)	APHA-3500-Pb B	mg/L	0.01	≤0.05	N.D.
16	Fluoride	APHA-4500F- C	mg/L	1.5	≤1.5	0.73
17	Aluminum	APHA-3500-Al	mg/L	≤0.2	≤0.2	N.A.
18	Manganese (Mn)	APHA-3500-Mn B	mg/L	0.5	≤0.5	N.D.
19	Cadmium (Cd)	APHA-3500-Cd B	mg/L	0.003	0.01	N.D.
20	Barium (Ba)	APHA-3500-Ba B	mg/L	0.7	0.7	0.07
21	Mercury (Hg)	APHA-3500-Hg B	mg/L	0.001	≤0.001	N.D.
22	Organic (Oil)	APHA-5520 Oil-B	mg/L	7	7	0.019
23	Zinc (Zn)	APHA-3500-Zn B	mg/L	5	5	1.09
24	Boron (B)	APHA-4500-B- C	mg/L	0.3	0.3	N.D.
25	Chromium (Cr)	APHA-3500-Cr B	mg/L	0.05	≤0.05	N.D.
26	Selenium (Se)	APHA-3500 Se C	mg/L	0.01	0.01	N.D.
27	Cyanide (CN)	APHA-4500-CN	mg/L	0.07	≤0.05	N.D.
28	E-Coli	APHA-9223 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA-9223 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

HQ/DQS
N D

National Drinking Water Quality Standards

World Health Organization

Not Detected

[illegible]

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-3 (SHAFT)
Sampling Date:	11-10-2023	Reporting Date:	[illegible]
Source:	Tap Water (Grid Line)	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:	N 34°[illegible], E 73°[illegible]		

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	APHA-4500H+ B	--	6.5-8.5	6.5-8.5	7.4
2.	Temperature	---	°C	---	---	11
3.	Taste & Odor	In-house	--	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA-2120 B	TCU	< 15	<15	6.7
5.	Turbidity	APHA-2130 B	NTU	<5	<5	3.0
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	362
7.	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	------	<500	204
8.	Nitrate (NO_3)	APHA-4500-NO3- B	mg/L	50	50	0.09
9.	Nitrite (NO_2)	APHA-4500-NO2- B	mg/L	3	3	0.09
10.	Arsenic (As)	APHA-3500-As B	mg/L	0.01	≤0.05	N.D
11.	Nickel (Ni)	AS 1812:2007-10	mg/L	0.02	≤0.02	N.D
12.	Antimony (Sb)	APHA-3113/3500-B	mg/L	0.005	<0.005	N.D
13.	Chloride (Cl)	APHA-4500-B	mg/L	250	<250	103
14.	Chlorine	APHA-4500-Cl	mg/L		0.6-1.5	0.03
15.	Lead (Pb)	APHA-3500-Pb-B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA-4500F- C	mg/L	1.5	≤1.5	0.62
17.	Aluminum	APHA-3500 Al	mg/L	0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA-3500-Mn-B	mg/L	0.5	≤0.5	N.D.
19.	Cadmium (Cd)	APHA-3500-Cd-B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA-3500-Ba B	mg/L	0.7	0.7	0.08
21.	Mercury (Hg)	APHA- 3500-Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA- 3500-Cu B	mg/L	2	2	0.060
23.	Zinc (Zn)	APHA- 3500-Zn B	mg/L	5	5	0.12
24.	Boron (B)	APHA-4500-B- C	mg/L	2.4	0.3	N.D
25.	Chromium (Cr)	APHA 3500 or B	mg/L	0.05	<0.05	N.D
26.	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D
27.	Cyanide (CN)	APHA-4500-CN	mg/L	0.07	≤0.05	N.D
28.	E-Coli	APHA-9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	3
29.	Total Coliform	APHA-9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	3

NDWQS: National Drinking Water Quality Standards; WHO: World Health Organization
N.D: Not Detected

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Khushal Colony, Warsak Road, Peshawar, Pakistan

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Kund-3 (Kinsten)
Sampling Date:	11-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Spring Water (Potable) 34.635195, 73.094481	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	APHA-4500H+ B	—	6.5-8.5	6.5-8.5	7.2
2.	Temperature	—	°C	—	—	8
3.	Taste & Odor	In-House	—	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA-2120 B/C	TCU	≤ 15	<15	3
5.	Turbidity	APHA-2130 B	NTU	<5	<5	2
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	331
7.	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	———	<500	249
8.	Nitrate (NO_3)	APHA-4500-NO3 B	mg/L	50	≤50	8.7
9.	Nitrite (NO_2)	APHA-4500-NO2 B	mg/L	3	≤3	0.19
10.	Arsenic (As)	APHA-3500-As B	mg/L	0.01	≤0.05	N.D.
11.	Nickel (Ni)	ASTM D5673-10	mg/L	0.02	≤0.02	N.D.
12.	Antimony (Sb)	APHA-3500-Sb B	mg/L	0.005	≤0.005	N.D.
13.	Chromium (Cr)	APHA-3500-Cr B	mg/L	250	<250	1.24
14.	Chlorine	APHA-4500 Cl-	mg/L		0.5-1.5	0.32
15.	Lead (Pb)	APHA-3500 Pb B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA-4500F- C	mg/L	1.5	<1.5	0.56
17.	Aluminum	APHA-3500 Al	mg/L	≤ 0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA-3500 Mn B	mg/L	0.5	≤0.5	N.D.
19.	Cadmium (Cd)	APHA-3500 Cd B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA-3500 Ba B	mg/L	0.3	0.7	0.19
21.	Mercury (Hg)	APHA-3500 Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA- 3500 Cu B	mg/L	2	2	N.D.
23.	Zinc (Zn)	APHA- 3500 Zn B	mg/L	3	5	1.24
24.	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26.	Molybdenum (Mo)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	<0.05	N.D.
28.	E-Coli	APHA-9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	Total Coliform	APHA-9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards; WHO: World Health Organization

N.D: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 03, Main Canal Road, Khyaban Colony Muslim Road, Peshawar, Pakistan

Tel: +92 91 5262323 Cell: +92 3000331303 Email: [illegible] www.iec.co.in/iellab.co.in

Environmental Protection Agency (EPA-KP) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:		Client Name:	
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-3 (Inflow)
Sampling Date:		Reporting Date:	
Source:	Flow Water (End User)	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:			

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH					
2.	Temperature					
3.						
4.	Color					
5.	Turbidity					
6.	Total Dissolved Solids (TDS)					
7.	Total Hardness as CaCO3					
8.						
9.						
10.	Arsenic (As)					
11.						
12.	Antimony (Sb)					
13.	Chloride (Cl)					
14.	Chlorine					
15.	Lead (Pb)					
16.	Fluoride					
17.	Aluminum					
18.	Manganese (Mn)					
19.	Cadmium (Cd)					
20.	Barium (Ba)					
21.	Mercury (Hg)					
22.	Copper (Cu)					
23.	Zinc (Zn)					
24.	Boron (B)					
25.	Chromium (Cr)					
26.	Selenium (Se)					
27.	Cyanide (CN)					
28.	E-Coli		Number/100 ml			
29.	Total Coliform		Number/100 ml			

NB/NDS: Nucleus Drinking Water Quality Standards 2003
N D: Not Detected

Head of Analysis

Head Health Department

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environmental Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Powerhouse (Switch)
Sampling Date:	11-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Spring Water (Surface) 34.804240° 73.379405°	Analysis Method:	APHA Latest Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NEWQS	Results
1.	pH	APHA 4500-H+ B	—	6.5-8.5	6.5-8.5	7.3
2.	Temperature	—	°C	—	—	9
3.	Taste & Odor	by Sense	—	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA 2120 B/C	TCU	≤ 15	≤15	1
5.	Turbidity	APHA 2130 B	NTU	<5	<5	2
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	< 1000	378
7.	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	288
8.	Nitrate (NO_3)	APHA 4500-NO_3 B	mg/L	50	≤50	0.07
9.	Nitrite (NO_2)	APHA 4500-NO_2 B	mg/L	3	≤3	0.03
10.	Arsenic (As)	APHA 3500-As B	mg/L	0.01	≤0.01	N.D.
11.	Nickel (Ni)	ASTM D5673-10	mg/L	0.02	≤0.02	0.003
12.	Antimony (Sb)	APHA 3500-Sb B	mg/l	0.005	≤0.005	N.D.
13.	Chloride (Cl)	APHA 4500-Cl- B	mg/L	250	<250	128
14.	Chlorine	APHA 4500 CL	mg/L		0.5-1.5	0.47
15.	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	≤0.05	0.006
16.	Fluoride	APHA 4500F- C	mg/L	1.5	≤1.5	1.2
17.	Aluminum	APHA 3500 Al	mg/l	≤ 0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.5	<0.5	N.D.
19.	Cadmium (Cd)	APHA 3500 Cd B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA 3500 Ba B	mg/L	0.3	0.7	0.04
21.	Mercury (Hg)	APHA 3500 Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA 3500 Cu B	mg/L	2	≤	N.D.
23.	Zinc (Zn)	APHA 3500 Zn B	mg/L	3	5	0.12
24.	Boron (B)	APHA 4500 B C	mg/L	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA 3500 Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D.
28.	E-Coli	APHA 9222 D	Number/100 ml	Must not be detectable in any 100 ml sample	0 Number/100 ml.	0
29.	Total Coliform	APHA 9222 B	Number/100 ml	Must not be detectable in any 100 ml sample	0 Number/100 ml.	0

NEWQS National Drinking Water Quality Standards WHO World Health Organization
N.D Not Detected

Director of Analysis

Chief Executive Officer

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 06, Main Canal Road, Akbarabad Colony Warsak Road, Peshawar, Pakistan

Environmental Protection Agency (EPA-4090) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	CGGC JV GRC
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	GRC Camp Office (Sangilan)
Sampling Date:	[illegible]	Reporting Date:	[illegible]
Source:	Spring Water (Source)	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:	34.[illegible], 73.[illegible]		

Sr. No.	Parameters	Standard Methods	Units	WHO	NEQS	Results
1.	pH	APHA 4500H+ B	–	6.5-8.5	6.5-8.5	7.9
2.	Temperature	—	°C	—	—	8
3.	Taste & Odor	Olfactive	–	Non-Objectionable	Non Objectionable	Non Objectionable
4.	Color	APHA 2120 B/C	TCU	≤ 15	≤15	4
5.	Turbidity	APHA 2130 B	NTU	<5	<5	2
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	388
7.	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	———	<500	227
8.	Nitrate (NO_3)	APHA 4500-NO3- B	mg/L	50	50	0.13
9.	Nitrite (NO_2)	APHA 4500-NO2- B	mg/L	3	3	0.42
10.	Arsenic (As)	APHA 3500-As B	mg/L	0.01	≤0.05	N.D.
11.	Mercury (Hg)	As M 10061-16	mg/L	0.001	≤0.001	0.0027
12.	Antimony (Sb)	APHA 3500-Sb B	mg/L	0.020	<0.005	N.D.
13.	Chromium (Cr)	APHA 4500-Cr B	mg/L	250	<1mg	1.20
14.	Chlorine	APHA 4500-Cl-	mg/L		0.5-1.5	0.50
15.	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA 4500F- C	mg/L	1.5	≤1.5	0.76
17.	Aluminum	APHA 3500 Al	mg/L	≤ 0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.5	≤0.5	N.D.
19.	Cadmium (Cd)	APHA 3500 Cd B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA 3500 Ba B	mg/L	0.7	0.7	0.18
21.	Mercury (Hg)	APHA 3500 Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA 3500 Cu B	mg/L	2	2	0.20
23.	Zinc (Zn)	APHA 3500 Zn B	mg/L	3	5	0.58
24.	Boron (B)	APHA 4500 B C	mg/L	0.3	0.3	N.D.
25.	Cyanide (Cn)	APHA 4500 Cn E	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA 3500 Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D.
28.	E-Coli	APHA 9221 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 ml	0
29.	Total Coliform	APHA 9221 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

WHO: World Health Organization
NEQS: National Drinking Water Quality Standards
M.D.: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 03, Main Cane Road, Muhsan Colony Wahdat Road, Peshawar, Pakistan

Tel: +92-91-5707373 Cell: +92-3005391003 Email: [illegible]@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydroelectric Project (300 MW)	Sampling Location:	GRC Camp Office (Bangkhar)
Sampling Date:	1[illegible]-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Tap Water (Grid Use) 34.55[illegible]N, 73.5[illegible]E	Analysis Method:	As per USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	APHA 4500H+ B	--	6.5-8.5	6.5-8.5	7.6
2.	Temperature	---	°C	---	---	19
3.	Taste & Odor	In-house	--	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA 2120 B/C	TCU	<15	<15	5
5.	Turbidity	APHA 2130 B	NTU	<5	<5	3.4
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	364
7.	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	381
8.	Nitrate (NO_3)	APHA 4500NO3 B	mg/L	50	<50	1.87
9.	Nitrite (NO_2)	APHA 4500NO2 B	mg/L	3	≤3	0.03
10.	Arsenic (As)	APHG 3500As B	mg/L	0.01	≤0.05	N.D.
11.	Nickel (Ni)	ASTM D5047-18	mg/L	0.02	<0.02	0.0001
12.	Antimony (Sb)	APHA [illegible]	mg/L	0.005	<0.005	N.D.
13.	Chlorine (Cl)	APHA 4500Cl- B	mg/L	250	<250	159
14.	Chlorine	APHA 4500 CL	mg/L		0.2-1.5	0.47
15.	Lead (Pb)	APHA 3120 B/3113 B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA 4500F- C	mg/L	1.5	≤1.5	0.83
17.	Aluminum	APHG 3500 Al	mg/L	0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.5	≤0.5	N.D.
19.	Cadmium (Cd)	APHG 3500 Cd B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA 3120 B& E	mg/L	0.3	0.7	0.23
21.	Mercury (Hg)	APHG 3500 Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA 3500 Cu B	mg/L	2	2	0.05
23.	Zinc (Zn)	APHA 3500 Zn B	mg/L	3	5	1.2
24.	Boron (B)	APHA 4500 B- C	mg/l	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA 3500 Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN_2)	APHA 4500-CN	mg/l	0.07	≤0.05	N.D.
28.	E-Coli	APHA 9221 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	Total Coliform	APHA 9221 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
N.D: Not Detected

Signature of Analyst: Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSES & SURVEYS

[illegible]

Environmental Protection Agency (EPA-478) Certified

Surface Water Monitoring Results (Third Quarter, 2023)

Integrated Environment Laboratory

SURFACE WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	CSGC J/V [illegible]
Project Name	Balakot Hydropower Project (300 MW)	Sampling Location	Dam Site (Pehra Valley)
Sampling Date	11-10-2023	Reporting Date	17-10-2023
Source/ GPS Coordinates	Kunhar River M 0682417, 13 1-01382	Analysis Method	APHA/USEPA Standard Method

Sr. No	Parameters	Analysis Method	Units	NEQS	Results
1)	Temperature	----	°C	40	7
2)	pH	APHA-4500H+ B	--	6-9	8.1
3)	Chemical Oxygen Demand (COD)	APHA-5220-D	mg/l	150	54
4)	Biological Oxygen Demand (BOD5) at 20 °C	APHA, 5210	mg/l	80	28.5
5)	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	1053
6)	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	56
7)	Total Hardness	APHA 2340 C	mg/l	--	158
8)	Oil & Grease	Sacsation Method	mg/l	10	3.7
9)	Chromium (Hexa & Trivalent)	APHA-3500Cr B	mg/l	1.0	0.28
10)	Total Iron	APHA-3500-Fe-B	mg/l	8.0	3.1
11)	Chloride	APHA-4500C- B	mg/l	1000	279
12)	Fluoride	APHA 4500F- C	mg/l	10	3.11
13)	Ammonia	ASTM D1426-15	mg/l	40	3.9
14)	Cadmium	APHA-3500-Cd-B	mg/l	0.1	N.D
15)	Lead	APHA-3500-Pb B	mg/l	0.5	N.D
16)	Arsenic	APHA-3500As B	mg/l	1.0	N.D
17)	Copper	APHA-3500Cu B	mg/l	1.0	0.04
18)	Barium	APHA-3500Ba B	mg/l	1.5	0.04
19)	Selenium	APHA- 3500 Se C	mg/l	0.5	N.D
20)	Silver	APHA-3500Ag-B	mg/l	1.0	N.D
21)	Manganese	APHA-3500-Mn B	mg/l	1.5	0.29
22)	Zinc	APHA-3500-Zn B	mg/l	5.0	0.45
23)	Nickel	ASTM D3867-90	mg/l	1.0	0.13
24)	Boron	APHA-4500B-C	mg/l	6.0	N.D
25)	Mercury	APHA-3500-Hg B	mg/l	0.01	N.D
26)	Sulphide (S^{-})	APHA-4500 S-	mg/l	1.0	0.33
27)	Sulphate (SO_4)	APHA-4500-SO_4 C	mg/l	600	348
28)	Anionic Detergent (as MBAS)	---	mg/l	20	0.05
29)	Phenolic Compounds (as Phenol)	APHA 5530-D	mg/l	0.1	0.03
30)	Cyanide (as CN) total	APHA 4500-CN	mg/l	1.0	N.D
31)	E-Coli	APHA 9222 D	Number/100 mL	---	Uncountable
32)	Total Coliform	APHA 9222 B	Number/100 mL	---	Uncountable

NEQS: National Environmental Quality Standards for Liquid Effluent N.D: Not Detected

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SURFACE WATER ANALYSIS REPORT

Reference Number:	SW/BHPC/MAY/-2023	Client Name:	CSCG JV (PVT)
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Tarbela Upstream (Tarbela)
Sampling Date:	11-05-2023	Reporting Date:	17-05-2023
Source: GPS Coordinates:	Kunhar River N: 867160, 73-3700751	Analysis Method:	APHA/USEPA Standard Methods

Sr. No	Parameters	Analysis Method	Units	NEQS	Results
1)	Temperature	----	°C	40	9
2)	pH	APHA-4500H-B	–	6-9	8.0
3)	Chemical Oxygen Demand (COD)	APHA-5220-D	mg/l	150	75
4)	Biological Oxygen Demand (BOD5) at 20 °C	APHA, 5210	mg/l	80	52.7
5)	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	2283
6)	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	120
7)	Total Hardness	APHA-2340 C	mg/l	--	167
8)	Oil & Grease	Separation Method	mg/l	10	1.34
9)	Chromium (Hexa & Trivalent)	APHA-3500-Cr B	mg/l	1.0	0.41
10)	Total Iron	APHA-3500-Fe-B	mg/l	8.0	3.37
11)	Chloride	APHA-4500Cl- B	mg/l	1000	195
12)	Fluoride	APHA-4500F- D	mg/l	10	2.1
13)	Ammonia	ASTM D1426-15	mg/l	40	3.90
14)	Cadmium	APHA-3500-Cd-B	mg/l	0.1	N.D
15)	Lead	APHA-3500-Pb B	mg/l	0.5	N.D
16)	Arsenic	APHA-3500-As B	mg/l	1.0	N.D
17)	Copper	APHA-3500-Cu B	mg/l	1.0	N.D
18)	Barium	APHA-3500-Ba B	mg/l	1.5	0.12
19)	Selenium	APHA- 3500 Se C	mg/l	0.5	N.D
20)	Silver	APHA-3500-Ag B	mg/l	1.0	N.D
21)	Manganese	APHA-3500-Mn B	mg/l	1.5	0.37
22)	Zinc	APHA-3500-Zn B	mg/l	5.0	0.67
23)	Nickel	ASTM D3867-90	mg/l	1.0	0.04
24)	Boron	APHA-4500-B C	mg/l	6.0	N.D
25)	Mercury	APHA-3500-Hg B	mg/l	0.01	N.D
26)	Sulphide (S^{2-})	APHA-4500-S- D	mg/l	1.0	0.21
27)	Sulphate (SO_4)	APHA-4500-SO4 C	mg/l	600	381
28)	An-ionic Detergent (as MBAS)	----	mg/l	20	1.10
29)	Phenolic Compound (as Phenol)	APHA-5530-D	mg/l	0.1	3.00
30)	Cyanide (as CN) Acid	APHA 4500-CN	mg/l	1.0	N.D
31)	E-Coli	APHA-9221-B	Number/100 ml	---	Unsatisfactory
32)	Total Coliform	APHA-9221-B	Number/100 ml	---	Unsatisfactory

NEQS: National Environmental Quality Standards for Liquid Effluents N.D: Not Detected

Signature of Analyst

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Local Road, Afshaan Colony, Warsak Road, Peshawar, Pakistan

Tel: +92 91 5203703-5 Cell: +92 3339 8910 73 Email: [illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SURFACE WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location	Celone Area (Barghar)
Sampling Date:	11-10-2023	Reporting Date:	17-10-2023
Source: GPS Coordinates:	Kunhar River 34.588103, 73.351638	Analysis Method	APHA/USEPA Standard [illegible]

Sr. No	Parameters	Analysis Method	Units	NEQS	Results
1)	Temperature	----	°C	40	11
2)	pH	APHA-4500H+ B	-	6-9	8.1
3)	Chemical Oxygen Demand (COD)	APHA-5220C	mg/l	150	36
4)	Biological Oxygen Demand (BOD5) at 20 °C	APHA, 5210	mg/l	80	43.8
5)	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	3001
6)	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	152.6
7)	Total Hardness	APHA-2340 C	mg/l	---	201
8)	Oil & Grease	Separation Method	mg/l	10	3.88
9)	Chromium (Hexa & Trivalent)	APHA-3500Cr B	mg/l	1.0	0.0
10)	Total Iron	APHA-3500-Fe B	mg/l	8.0	2.55
11)	Chloride	APHA-4500Cl- B	mg/l	1000	360
12)	Fluoride	APHA-4500F- C	mg/l	10	1.71
13)	Ammonia	ASTM-D1426-15	mg/l	40	0.8
14)	Cadmium	APHA-3500 Cd-B	mg/l	0.1	N.D
15)	Lead	APHA-3500-Pb B	mg/l	0.5	0.003
16)	Arsenic	APHA-3500As B	mg/l	1.0	N.D
17)	Copper	APHA-3500Cu B	mg/l	1.0	N.D
18)	Barium	APHA-3500Ba B	mg/l	1.5	0.0095
19)	Selenium	APHA- 3500-Se C	mg/l	0.5	N.D
20)	Silver	APHA-3500Ag B	mg/l	1.0	N.D
21)	Manganese	APHA-3500-Mn B	mg/l	1.5	0.13
22)	Zinc	APHA-3500-Zn B	mg/l	5.0	0.47
23)	Nickel	ASTM D1427-11	mg/l	1.0	0.009
24)	Boron	APHA-4500B-C	mg/l	6.0	N.D
25)	Mercury	APHA-3500 Hg B	mg/l	0.01	N.D
26)	Sulphide (S^{2-})	APHA-4500-S^{2-} D	mg/l	1.0	0.20
27)	Sulphate (SO_4)	APHA-4500-SO_4 C	mg/l	600	545
28)	Anionic Detergent (as MBAS)	---	mg/l	20	0.91
29)	Phenolic Compounds (as Phenol)	APHA-5530 D	mg/l	0.1	0.045
30)	Cyanide (as CN) Total	APHA 4500-CN	mg/l	1.0	N.D
31)	E Coli	APHA 9222 D	Number/100 ml	---	Unsatisfactory
32)	Total Coliform	APHA 9222 B	Number/100 ml	---	Unsatisfactory

NEQS: National Environmental Quality Standards for Liquid Effluents (E.P.A)

Operations Officer

Assistant Manager Quality Control

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency EPA 4040 Certified

Soil Analysis Results (Third Quarter, 2023)

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	[illegible]	Sampling Location:	[illegible]
Monitoring Date:	[illegible]	Reporting Date:	[illegible]
Source:	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	21
		Silt%	33
		Clay %	20
		Texture Class	Silty Clay Loam
2	pH		7.8
3	Electrical Conductivity EC (µSec^{-1})		340
4	Phosphorus (mgkg^{-1})		1.88
5	Sodium Absorption Ratio		0.80

µSec^{-1}: Micro siemens/meter

mgkg^{-1}: milligram per kilogram

Signature of Analyst

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-2 (Shirvai)
Monitoring Date:	[illegible]	Reporting Date:	[illegible]
Source:	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	11
		Silt%	48
		Clay %	37
		Texture Class	Silty Clay Loam
2	pH		8.6
3	Electrical Conductivity EC (µSm^{-1})		333
4	Phosphorus (mgkg^{-1})		2.2
5	Sodium Absorption Ratio		4.38

µSm^{-1}: micro siemens/meter
mgkg^{-1}: milligram per kilogram

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Ajeebuar Colony Warsak Road, Peshawar, Pakistan

Tel: [illegible] Email: [illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name	Balakot [illegible] Project (300 MW)	Sampling Location	Adit 3 (Khalwa)
Monitoring Date	11-10-2023	Reporting Date	17-10-2023
Source	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	73
		Silt%	69
		Clay %	20
		Texture Class	Silty Clay Loam
2	pH		8.3
3	Electrical Conductivity EC (µSm^{-1})		230
4	Phosphorous (mg/kg^{-1})		2.80
5	Sodium Absorption Ratio		5.47

µSm^{-1}: micro siemens/meter
mg/kg^{-1}: milligram per Kilogram

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Main Canal Road, Khushal Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5203133 Cell: +92 3007581283 Email: [illegible]

Environmental Protection Agency (EPA 4748) Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name	Balakot [illegible] Project (300 MW)	Sampling Location	Powerhouse (Barrut)
Monitoring Date	[illegible]	Reporting Date	[illegible]
Source	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	19
		Silt%	52
		Clay %	29
		Texture Class	Silty Clay Loam
2	pH		8.0
3	Electrical Conductivity EC (μSm^{-1})		241
4	Phosphorus ($mgkg^{-1}$)		2.87
5	Sodium Absorption Ratio		3.33

μSm^{-1}: micro siemens/meter

$mgkg^{-1}$: milligram per Kilogram

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number		Client Name	
Project Name:	Pumped Storage Project (PSP)	Sampling Location:	CPC Camp Office Balakot
Monitoring Date:		Reporting Date:	
Source:	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	21
		Silt %	43
		Clay %	33
		Texture Class	Silty Clay Loam
2	pH		8.1
3	Electrical Conductivity (EC $\mu S/cm^{-1}$)		238
4	Phosphorus (mg/kg $^{-1}$)		3.81
5	Sodium Absorption Ratio		3.64

$\mu S/cm^{-1}$: Micro siemens/cm

mg/kg^{-1}: milligram per Kilogram

Manager IEL

Synthesis of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Sh. Syed Riz Ali, Main Canal Road, Abdul Gul Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5252323 Cell: +92 3005331053 Email: iel.info@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KP) Certified

Ambient Air Monitoring Results (Fourth Quarter, 2023)-Particulate Matters

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	IEL/PPW/[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Dam Site (Pavia Valley)
Monitoring Date:	06.12.2023	Reporting Date:	08.12.2023
Source: GPS Coordinates:	Ambient Air 34.8004°N, 73.4934°E	Monitoring Instrument:	HVAS Kit, Serial # 1313

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
	Hours of Monitoring	Units (µg/m³)	(µg/m³)		
1.	09:00 A.M	22.09	64.42		
2.	10:00 A.M	21.81	65.28		
3.	11:00 A.M	19.89	63.14		
4.	12:00 P.M	18.94	61.02		
5.	01:00 P.M	19.42	63.48		
6.	02:00 P.M	19.83	64.77		
7.	03:00 P.M	19.47	62.24		
8.	04:00 P.M	19.21	61.42		
9.	05:00 P.M	17.91	57.9		
10.	06:00 P.M	16.74	55.08		
11.	07:00 P.M	16.81	54.65		
12.	08:00 P.M	16.37	50.01	17.88 (µg/m³)	90.34 (µg/m³)
13.	09:00 P.M	15.9	53.31		
14.	10:00 P.M	17.24	52.58		
15.	11:00 P.M	14.88	52.06		
16.	12:00 A.M	16.86	49.33		
17.	01:00 A.M	16	48.8		
18.	02:00 A.M	17.22	50.09		
19.	03:00 A.M	16.87	50.02		
20.	04:00 A.M	16.49	48.83		
21.	05:00 A.M	15.94	49.89		
22.	06:00 A.M	15.17	51.96		
23.	07:00 A.M	19.89	52.67		
24.	08:00 A.M	17.93	54		
NEQSAA				35(µg/m³)	160(µg/m³)
WHO				15 (µg/m³)	40 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated
- The client responsible lawful usage of reported data in future
- The report shall valid for court

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abdhaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000891053 Email: [illegible] www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Suki Kinari Hydropower Project (300 MW)	Monitoring Location:	Kiln 1 (Thuko)
Monitoring Date:	11-12-2023	Reporting Date:	18-12-2023
Source: GPS Coordinates:	Ambient Air 34.678128, 73.428597	Monitoring Instrument:	AQMS 65, Serial # 1210

Sr. No.	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours of Monitoring	(µg/m³)	(µg/m³)		
1.	09:00 A.M	20.22	47.16	18.44 (µg/m³)	59.92 (µg/m³)
2.	10:00 A.M	22.81	48.43		
3.	11:00 A.M	19.89	66.89		
4.	12:00 P.M	19.84	78.11		
5.	01:00 P.M	18.87	68.82		
6.	02:00 P.M	20.33	67.91		
7.	03:00 P.M	20.27	65.38		
8.	04:00 P.M	19.87	64.16		
9.	05:00 P.M	18.77	60.04		
10.	06:00 P.M	17.94	59.42		
11.	07:00 P.M	16.77	57.59		
12.	08:00 P.M	17.12	58.17		
13.	09:00 P.M	17.81	59.45		
14.	10:00 P.M	18.04	60.72		
15.	11:00 P.M	15.78	58.2		
16.	12:00 A.M	17.66	62.47		
17.	01:00 A.M	19.8	71.94		
18.	02:00 A.M	18.37	63.23		
19.	03:00 A.M	17.61	59.68		
20.	04:00 A.M	17.75	61.87		
21.	05:00 A.M	18.84	67.92		
22.	06:00 A.M	15.97	55.1		
23.	07:00 A.M	17.55	60.01		
24.	08:00 A.M	18.17	59.84		
NESSAA				35(µg/m³)	150(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NESSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated.
- The report is experimental lawful usage of reported data in future.
- The report is not valid for court.

[illegible] Analyst

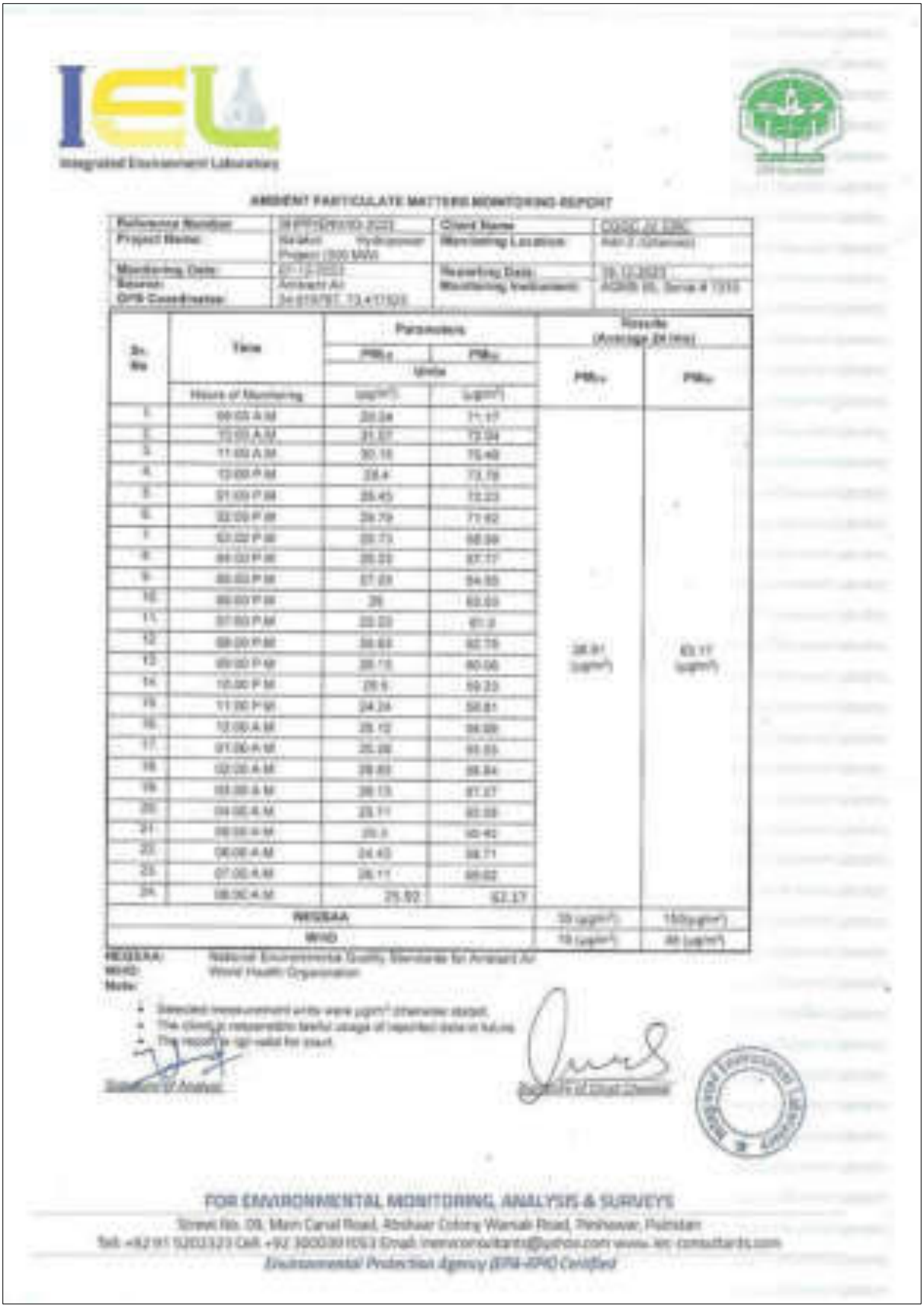
[illegible] Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akahsar Colony Warsak Road, Peshawar, Pakistan

Cell: +92 91 5202323 Cell: +92 3020391053 Email: iewconsultants@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	IEL/PSQ/03-2023	Client Name:	CGGC (P) Ltd.
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adit 2 (Gharwal)
Monitoring Date:	07-12-2023	Reporting Date:	18-12-2023
Source:	Ambient Air	Monitoring Instrument:	ADMS 05, Serial # 7310
GPS Coordinates:	34.619787, 73.417323		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours of Monitoring	ug/m³	ug/m³		
1.	09:00 A.M	20.04	71.17	38.91 ug/m³	63.17 ug/m³
2.	10:00 A.M	21.57	72.04		
3.	11:00 A.M	30.16	75.40		
4.	12:00 P.M	28.4	73.79		
5.	01:00 P.M	25.45	72.23		
6.	02:00 P.M	29.79	77.62		
7.	03:00 P.M	33.71	68.99		
8.	04:00 P.M	35.23	67.77		
9.	05:00 P.M	57.29	94.55		
10.	06:00 P.M	39	63.03		
11.	07:00 P.M	33.03	61.2		
12.	08:00 P.M	39.63	62.79		
13.	09:00 P.M	35.15	60.06		
14.	10:00 P.M	28.5	59.23		
15.	11:00 P.M	24.24	58.81		
16.	12:00 A.M	25.12	58.89		
17.	01:00 A.M	25.28	59.05		
18.	02:00 A.M	28.83	58.84		
19.	03:00 A.M	38.13	61.27		
20.	04:00 A.M	23.11	60.09		
21.	05:00 A.M	20.1	60.42		
22.	06:00 A.M	24.43	58.71		
23.	07:00 A.M	26.11	59.02		
24.	08:00 A.M	25.92	62.17		
NEQSAA				35 ug/m³	150 ug/m³
WHO				15 ug/m³	45 ug/m³

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Authority of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Khyber Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5203323 Cell: +92 3005991653 Email: ielenvconsultants@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	IEL/[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adit 3 (Kitchen)
Monitoring Date:	09.12.2023	Reporting Date:	15.12.2023
Source: GPS Coordinates:	Ambient Air 34.810333,73.565387	Monitoring Instrument:	HORIBA Model: [illegible]

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}		
		Units		$PM_{2.5}$	PM_{10}
	Hours of Monitoring	(µg/m³)	(µg/m³)		
1	09:00 A.M	32.29	64.49	28.96 (µg/m³)	90.51 (µg/m³)
2	10:00 A.M	31.88	64.37		
3	11:00 A.M	31.06	63.77		
4	12:00 P.M	26.31	97.08		
5	01:00 P.M	30.94	68.61		
6	02:00 P.M	36.7	94.3		
7	03:00 P.M	30.84	62.27		
8	04:00 P.M	30.24	61.05		
9	05:00 P.M	29.14	97.83		
10	06:00 P.M	27.91	66.31		
11	07:00 P.M	27.14	64.58		
12	08:00 P.M	27.34	66.09		
13	09:00 P.M	28.04	93.34		
14	10:00 P.M	28.41	62.47		
15	11:00 P.M	26.19	62.09		
16	12:00 A.M	28.03	70.36		
17	01:00 A.M	27.17	70.83		
18	02:00 A.M	28.74	62.12		
19	03:00 A.M	29.09	61.69		
20	04:00 A.M	27.60	70.66		
21	05:00 A.M	27.21	70.71		
22	06:00 A.M	26.34	61.90		
23	07:00 A.M	28.02	62.9		
24	08:00 A.M	28.64	66.89		
NEQSAA				35 (µg/m³)	150(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshair Colony, Warsak Road, Peshawar, Pakistan
Tel#: +92 91 5202323 Cell: +92 3000391053 Email: ievhecnsultants@yahoo.com www.iec-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Powerhouse (Balkot)
Monitoring Date:	04.12.2023	Reporting Date:	19.12.2023
Source: GPS Coordinates:	Ambient Air 34.503512, 73.377349	Monitoring Instruments:	AQMS IC, Serial # 1212

Sr. No.	Time	Parameters		Results (Average 24 hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours of Monitoring	(ug/m3)	(ug/m3)		
1.	09:00 A.M	31.79	84.40	23.62 (ug/m³)	76.58 (ug/m³)
2.	10:00 A.M	28.52	85.32		
3.	11:00 A.M	27.9	83.77		
4.	12:00 P.M	28.85	81.05		
5.	01:00 P.M	25.68	85.91		
6.	02:00 P.M	27.24	84.8		
7.	03:00 P.M	27.18	80.37		
8.	04:00 P.M	28.74	81.05		
9.	05:00 P.M	29.68	87.93		
10.	06:00 P.M	21.42	75.36		
11.	07:00 P.M	20.65	73.62		
12.	08:00 P.M	21.05	74.1		
13.	09:00 P.M	21.85	72.38		
14.	10:00 P.M	21.62	71.68		
15.	11:00 P.M	19.85	71.13		
16.	12:00 A.M	21.94	68.6		
17.	01:00 A.M	20.68	67.87		
18.	02:00 A.M	27.25	69.16		
19.	03:00 A.M	21.55	68.09		
20.	04:00 A.M	21.13	67.9		
21.	05:00 A.M	28.77	64.19		
22.	06:00 A.M	19.85	71.03		
23.	07:00 A.M	21.52	71.56		
24.	08:00 A.M	22.09	73.82		
NEQSAA				35 (ug/m³)	150(ug/m³)
WHO				15 (ug/m³)	45 (ug/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were ug/m³ otherwise stated.
- The client is responsible for usage of reported data in future.
- The report is not valid for court.

Analyst

Authorized Signatory

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Khushal Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3005591693 Email: iecconsultants@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA) KPK Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Tehsil Balakot, Upamain District
Monitoring Date:	12-12-2023	Reporting Date:	14-12-2023
Source: (GPS Coordinates)	Ambient Air [illegible]	Monitoring Instrument:	AQM-03, Serial # 1010

Sr. No.	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}		
		Units		$PM_{2.5}$	PM_{10}
	Hours of Monitoring	(µg/m³)	(µg/m³)		
1	09:00 A.M	17.94	42.28	16.16 (µg/m³)	34.35 (µg/m³)
2	10:00 A.M	18.22	43.16		
3	11:00 A.M	17.4	41.01		
4	12:00 P.M	19.85	46.9		
5	01:00 P.M	19.69	43.35		
6	02:00 P.M	17.04	42.04		
7	03:00 P.M	15.98	40.11		
8	04:00 P.M	15.64	39.84		
9	05:00 P.M	15.48	36.87		
10	06:00 P.M	14.25	34.16		
11	07:00 P.M	13.46	32.42		
12	08:00 P.M	13.88	33.9		
13	09:00 P.M	14.58	31.18		
14	10:00 P.M	14.73	30.43		
15	11:00 P.M	12.49	29.93		
16	12:00 A.M	14.27	27.2		
17	01:00 A.M	13.01	25.87		
18	02:00 A.M	10.03	21.56		
19	03:00 A.M	14.39	28.76		
20	04:00 A.M	13.66	26.7		
21	05:00 A.M	11.11	21.11		
22	06:00 A.M	13.69	28.83		
23	07:00 A.M	14.39	30.74		
24	08:00 A.M	14.88	34.73		
NEQS/AA				35 (µg/m³)	150(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQS/AA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated
- The client is responsible lawful usage of reported data in future
- This report is not valid for court

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Shop No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5202323 Cell: +92 3002301053 Email: [illegible] www.iec-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	[illegible]	Client Name:	CGGC JV GRC
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	GRC Camp Office (Garhian)
Monitoring Date:	11.12.2023	Reporting Date:	19.12.2023
Source: GPS Coordinates:	Ambient Air 34.594502, 73.3736/9	Monitoring Instrument:	AQMS-5A, Serial # 1310

Sr. No.	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours of Monitoring	(µg/m³)	(µg/m³)		
1.	09:00 A.M	21.17	67.21	14.99 (µg/m³)	99.27 (µg/m³)
2.	10:00 A.M	18.9	95.58		
3.	11:00 A.M	16.84	90.33		
4.	12:00 P.M	16.33	89.82		
5.	01:00 P.M	16.29	88.27		
6.	02:00 P.M	16.63	87.58		
7.	03:00 P.M	16.99	86.23		
8.	04:00 P.M	16.16	83.81		
9.	05:00 P.M	15.45	82.59		
10.	06:00 P.M	13.83	99.07		
11.	07:00 P.M	13.66	97.34		
12.	08:00 P.M	13.49	96.82		
13.	09:00 P.M	13.86	95.1		
14.	10:00 P.M	14.23	93.37		
15.	11:00 P.M	12.27	94.66		
16.	12:00 A.M	15.86	92.12		
17.	01:00 A.M	13.59	91.58		
18.	02:00 A.M	14.40	92.58		
19.	03:00 A.M	13.96	93.31		
20.	04:00 A.M	13.64	91.52		
21.	05:00 A.M	12.13	92.47		
22.	06:00 A.M	13.28	94.75		
23.	07:00 A.M	13.94	93.68		
24.	08:00 A.M	14.46	93.63		
NEQSAA				35 (µg/m³)	150 (µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Selected measurement units were µg/m³ otherwise stated.
- The client is responsible for usage of reported data in future.
- The report is not valid for court.

Reviewed and Verified by:

Environmental Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Rahbar Colony Warsak Road, Peshawar, Pakistan

Tele: +92 91 5202323 Cell: +92 3035091053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number:	IEL/PAR/EMW/BS-2023	Client Name:	CGGC-AI GRC
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Colony Area (Sanghar)
Monitoring Date:	12.12.2023	Reporting Date:	16.12.2023
Source: GPS Coordinates:	Ambient Air 34.567115, 72.900225	Monitoring Instrument:	HQ40 SD, Serial # 1315

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
	Hours of Monitoring	Units			
		(µg/m³)	(µg/m³)		
1.	09:00 A.M	30.08	71.82	27.04 (µg/m³)	93.89 (µg/m³)
2.	10:00 A.M	31.31	72.79		
3.	11:00 A.M	28.58	71.24		
4.	12:00 P.M	26.64	74.03		
5.	01:00 P.M	28.97	72.89		
6.	02:00 P.M	24.03	72.37		
7.	03:00 P.M	28.97	69.14		
8.	04:00 P.M	26.37	68.02		
9.	05:00 P.M	27.47	64.3		
10.	06:00 P.M	25.24	63.78		
11.	07:00 P.M	25.47	62.05		
12.	08:00 P.M	25.87	63.53		
13.	09:00 P.M	26.37	60.81		
14.	10:00 P.M	26.74	63.08		
15.	11:00 P.M	24.46	58.08		
16.	12:00 A.M	26.39	58.83		
17.	01:00 A.M	25.5	58.5		
18.	02:00 A.M	27.07	57.09		
19.	03:00 A.M	26.37	58.02		
20.	04:00 A.M	25.55	56.33		
21.	05:00 A.M	25.64	57.18		
22.	06:00 A.M	24.07	55.46		
23.	07:00 A.M	26.28	60.37		
24.	08:00 A.M	24.07	61.6		
NEQSAA				35 (µg/m³)	150(µg/m³)
WHO				15 (µg/m³)	45 (µg/m³)

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization
Note:

- Detection measurement units are µg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5303333 Cell: +92 3000391093 E-mail: iel.consultants@yahoo.com www.iel-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

Ambient Gaseous Monitoring Results (Fourth Quarter, 2023)

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Dam Site (Pehak Valley)
Monitoring Date:	06.12.2023	Reporting Date:	12.12.2023
Source: GPS Coordinates:	Ambient Air Gases [illegible]	Monitoring Instrument:	[illegible]

Sr. No	Time	Parameters			
		CO	SO	NO_2	SO_2
		Units			
	Hours	(mg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1	09:00 A.M	0.48	7.34	9.20	6.84
2	10:00 A.M	0.51	6.20	9.47	6.93
3	11:00 A.M	0.43	6.40	9.74	7.8
4	12:00 P.M	0.46	6.21	9.05	7.63
5	01:00 P.M	0.39	6.01	9.52	6.28
6	02:00 P.M	0.48	6.79	9.83	7.16
7	03:00 P.M	0.46	7.23	9.85	7.78
8	04:00 P.M	0.4	6.47	9.19	6.87
9	05:00 P.M	0.37	7.03	9.08	6.8
10	06:00 P.M	0.42	7.8	9.79	7.29
11	07:00 P.M	0.47	6.18	9.30	6.71
12	08:00 P.M	0.29	6.01	9.47	6.26
13	09:00 P.M	0.4	6.32	9.8	7.86
14	10:00 P.M	0.39	7.5	9.75	7.82
15	11:00 P.M	0.29	7.11	9.68	6.4
16	12:00 A.M	0.41	6.75	9.83	6.79
17	01:00 A.M	0.38	6.42	9.57	7.08
18	02:00 A.M	0.37	7.01	9.33	7.46
19	03:00 A.M	0.31	6.46	9.41	7.27
20	04:00 A.M	0.38	6.07	9.04	7.38
21	05:00 A.M	0.43	6.41	9.47	7.65
22	06:00 A.M	0.47	7.46	9.33	6.71
23	07:00 A.M	0.42	6.71	9.02	6.4
24	08:00 A.M	0.46	7.39	9.72	6.87
Average Concentration		0.41	6.84	9.58	7.04
NEQSAA		05	40	80	120
WHO		04	[illegible]	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³& mg/m³ otherwise stated
- The client is responsible lawful usage of reported data in future
- The report is not valid for court.

[illegible]

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5303329 Cell: +92 3000 [illegible] Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-[illegible] Certified

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adit-1 (Thoko)
Monitoring Date:	11-12-2023	Reporting Date:	16-12-2023
Source:	Ambient Air Gases	Monitoring Instrument:	AQM0 60, Serial # 1010
GPS Coordinates:	34.636135, 73.429597		

Sr. No.	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	mg/m³	µg/m³	µg/m³	µg/m³
1	09:00 A.M	5.83	11.96	13.01	13.42
2	10:00 A.M	5.94	12.62	15.57	11.51
3	11:00 A.M	5.87	12.62	14.00	10.88
4	12:00 P.M	5.82	12.23	14.27	11.62
5	01:00 P.M	5.94	12.71	14.85	9.95
6	02:00 P.M	5.73	12.49	15.02	11.06
7	03:00 P.M	5.99	12.25	13.82	9.46
8	04:00 P.M	5.98	13.2	14.06	10.31
9	05:00 P.M	5.82	12.72	11.39	10.36
10	06:00 P.M	5.93	12.63	11.7	10.31
11	07:00 P.M	5.94	11.84	12.32	10.39
12	08:00 P.M	5.94	12.92	12.13	10.04
13	09:00 P.M	5.94	9.83	10.06	8.79
14	10:00 P.M	5.93	9.4	9.82	8.39
15	11:00 P.M	5.94	9.72	10.14	8.07
16	12:00 A.M	5.96	9.5	10.02	7.98
17	01:00 A.M	5.97	9.76	10.09	8.06
18	02:00 A.M	5.94	10.94	11.58	8.51
19	03:00 A.M	5.93	10.72	11.28	7.46
20	04:00 A.M	5.97	10.62	11.14	7.79
21	05:00 A.M	5.93	11.05	11.58	7.09
22	06:00 A.M	5.91	9.83	10.36	7.58
23	07:00 A.M	5.92	10.25	10.77	7.46
24	08:00 A.M	5.93	9.72	9.94	8.7
Average Concentration:		5.43	11.34	11.82	9.29
NEQSAA		35	40	80	120
WHO		86	--	39	48

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³& mg/m³ otherwise stated
- The client is responsible lawful usage of reported data in future
- The report is not valid for court

Technical Manager

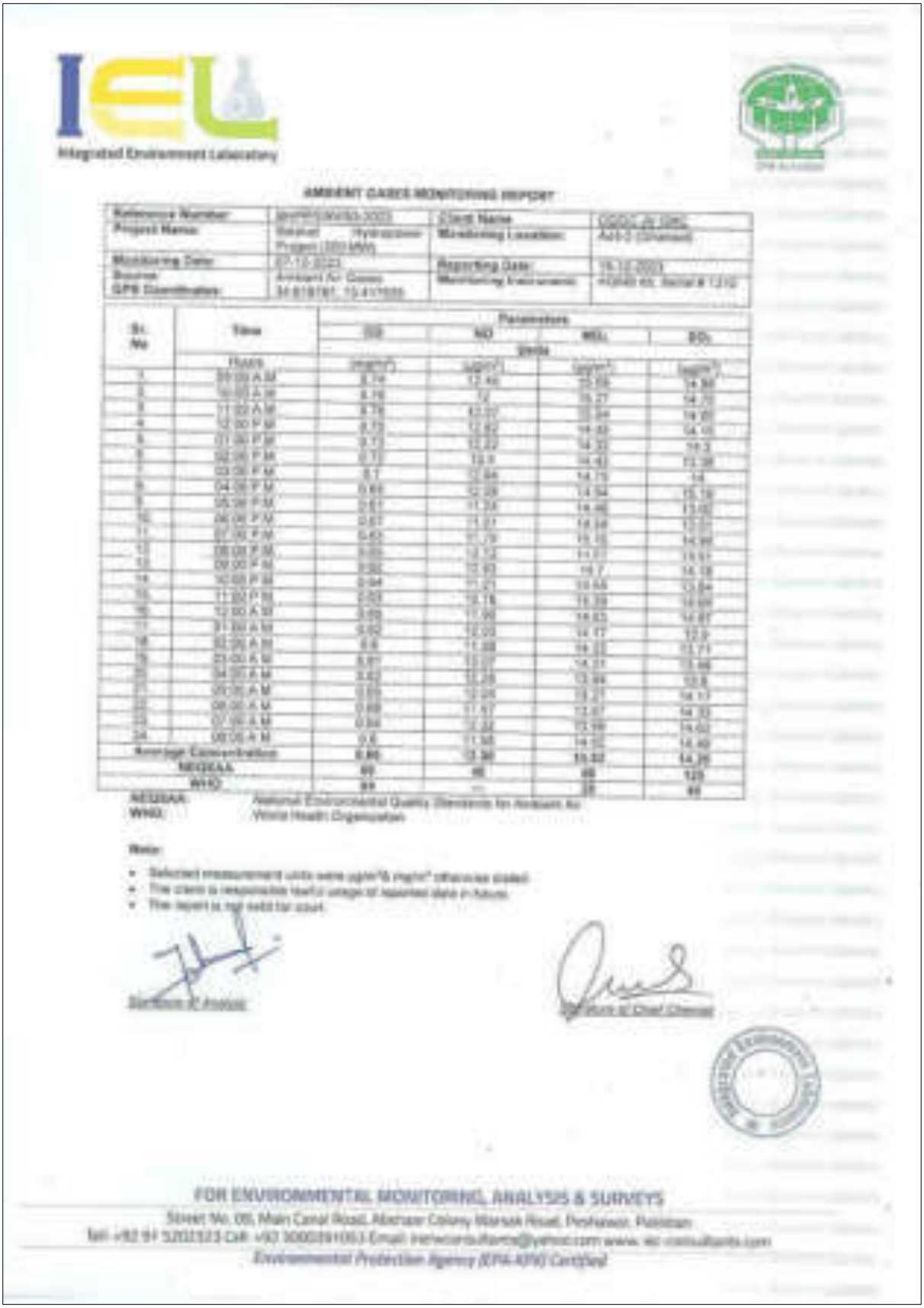
Technical Director

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abdullah Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3059394353 Email: ielenvironmentalconsultants@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydroelectric Project (300 MW)	Monitoring Location:	Adit-2 (Channel)
Monitoring Date:	07-12-2023	Reporting Date:	16-12-2023
Source:	Ambient Air Gases	Monitoring Instrument:	[illegible]
GPS Coordinates:	34.819781, 73.417555		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
		PPM	µg/m³	µg/m³	µg/m³
1	09:00 A.M	0.74	12.40	15.55	14.80
2	10:00 A.M	0.76	12	15.27	14.70
3	11:00 A.M	0.79	12.01	15.64	14.85
4	12:00 P.M	0.75	12.62	14.83	14.15
5	01:00 P.M	0.77	12.02	14.33	14.3
6	02:00 P.M	0.72	12.1	14.43	13.98
7	03:00 P.M	0.7	12.04	14.73	14
8	04:00 P.M	0.68	12.08	14.54	13.79
9	05:00 P.M	0.67	11.74	14.46	13.65
10	06:00 P.M	0.67	11.71	14.34	13.61
11	07:00 P.M	0.43	11.79	15.15	14.99
12	08:00 P.M	0.69	12.12	14.57	13.91
13	09:00 P.M	0.66	12.43	14.7	14.19
14	10:00 P.M	0.64	11.73	13.65	13.64
15	11:00 P.M	0.63	12.16	13.39	13.69
16	12:00 A.M	0.69	11.96	14.63	14.67
17	01:00 A.M	0.62	12.03	14.17	13.9
18	02:00 A.M	0.6	11.88	14.31	13.71
19	03:00 A.M	0.61	12.07	14.21	13.88
20	04:00 A.M	0.62	12.28	13.94	13.8
21	05:00 A.M	0.69	12.04	14.2	14.11
22	06:00 A.M	0.68	11.97	13.67	14.33
23	07:00 A.M	0.64	12.02	13.98	14.02
24	08:00 A.M	0.6	11.95	14.02	14.49
Average Concentration		0.66	12.00	14.32	14.06
NEQSAA		80	40	40	120
WHO		87	---	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³& mg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbarpur Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5201523 Cell: +92 3000391063 Email: [illegible] www.iel-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[redacted]	Client Name:	[redacted]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Kuto 3 (Khoksar)
Monitoring Date:	28.12.2023	Reporting Date:	30.12.2023
Source:	Ambient Air Gases	Monitoring Instrument:	[redacted]
GPS Coordinates:	[redacted]		

Sr. No	Time	Parameters			
		CO	SO2	NO2	NH3
		Units			
	Hours	PPM	µg/m³	µg/m³	µg/m³
1	09:00 A.M	0.82	32.45	24.37	22.46
2	10:00 A.M	0.69	31.28	24.80	21.35
3	11:00 A.M	0.8	31.33	24.12	22.30
4	12:00 P.M	0.81	34.1	23.83	22.79
5	01:00 P.M	0.84	33.5	23.8	23.9
6	02:00 P.M	0.83	31.89	23.81	21.96
7	03:00 P.M	0.81	34.22	23.97	23.8
8	04:00 P.M	0.76	31.09	24.13	22.79
9	05:00 P.M	0.73	34.42	23.54	21.52
10	06:00 P.M	0.78	31.29	18.29	16.42
11	07:00 P.M	0.84	34.27	19.47	17.83
12	08:00 P.M	0.7	30.4	17.76	17.93
13	09:00 P.M	0.69	17.21	18.21	17.09
14	10:00 P.M	0.71	16.49	18.98	18.79
15	11:00 P.M	0.64	16.09	18.88	17.8
16	12:00 A.M	0.76	16.24	18.14	17.86
17	01:00 A.M	0.73	16.21	17.98	18.91
18	02:00 A.M	0.8	16.58	17.84	19.02
19	03:00 A.M	0.83	17.26	17.72	18.4
20	04:00 A.M	0.73	16.58	17.76	18.71
21	05:00 A.M	0.78	16.72	18.19	17.09
22	06:00 A.M	0.76	16.49	17.64	17.24
23	07:00 A.M	0.79	16.8	17.93	17.53
24	08:00 A.M	0.81	15.64	18.03	17.4
Average Concentration		0.76	18.58	20.19	19.24
NEQSAA		50	40	80	120
WHO		64	---	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³ & mg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

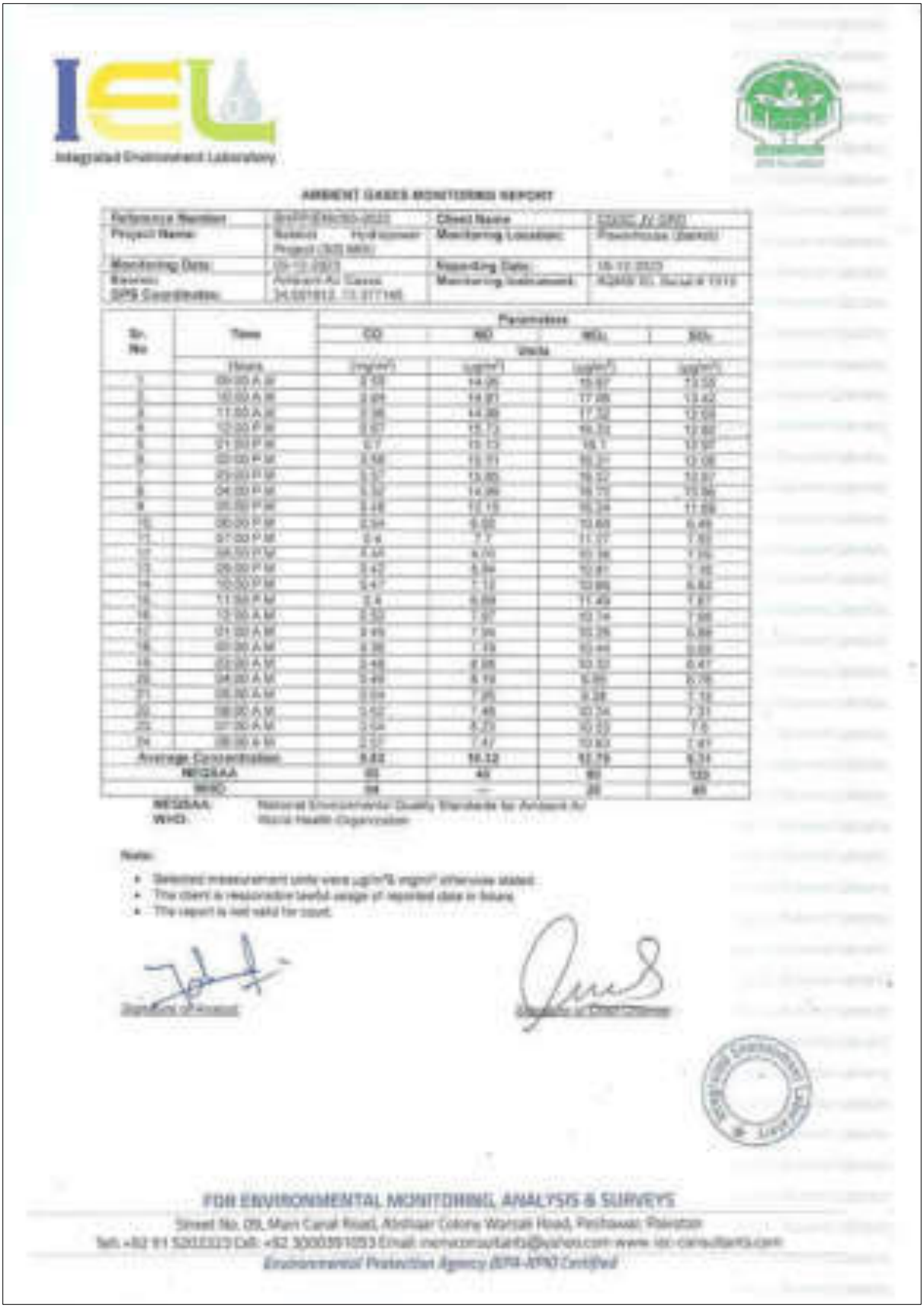
Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

[redacted]

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Powerhouse (Balakot)
Monitoring Date:	05-12-2023	Reporting Date:	08-12-2023
Source: GPS Coordinates:	Ambient Air Gases 34.551812, 73.317145	Monitoring Instrument:	[illegible]

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	(Hours)	(mg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
1	09:00 A.M	6.58	14.26	19.97	13.55
2	10:00 A.M	3.49	14.81	17.68	13.42
3	11:00 A.M	3.36	14.36	17.32	12.58
4	12:00 P.M	3.67	15.13	16.73	12.62
5	01:00 P.M	3.7	15.13	16.1	13.97
6	02:00 P.M	3.58	13.91	16.21	12.08
7	03:00 P.M	3.57	13.85	16.17	13.87
8	04:00 P.M	3.52	14.26	16.75	13.96
9	05:00 P.M	3.48	12.15	16.24	11.89
10	06:00 P.M	3.54	5.65	13.65	6.49
11	07:00 P.M	3.5	7.7	11.17	7.83
12	08:00 P.M	3.44	8.03	10.38	7.95
13	09:00 P.M	3.47	8.34	10.81	7.95
14	10:00 P.M	3.47	7.13	10.89	6.82
15	11:00 P.M	3.4	6.89	11.49	7.87
16	12:00 A.M	3.39	7.37	10.14	7.98
17	01:00 A.M	3.45	7.39	10.26	6.84
18	02:00 A.M	3.38	7.19	10.44	6.69
19	03:00 A.M	3.48	8.08	10.32	6.47
20	04:00 A.M	3.49	8.19	9.99	6.78
21	05:00 A.M	3.54	7.95	9.28	7.19
22	06:00 A.M	3.62	7.48	10.24	7.31
23	07:00 A.M	3.54	8.73	10.13	7.5
24	08:00 A.M	3.57	7.47	10.83	7.91
Average Concentration		3.52	10.12	12.79	9.34
NEQSAA		05	40	80	120
WHO		04	—	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³& mg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- The report is void valid for court.

Signature of Analyst

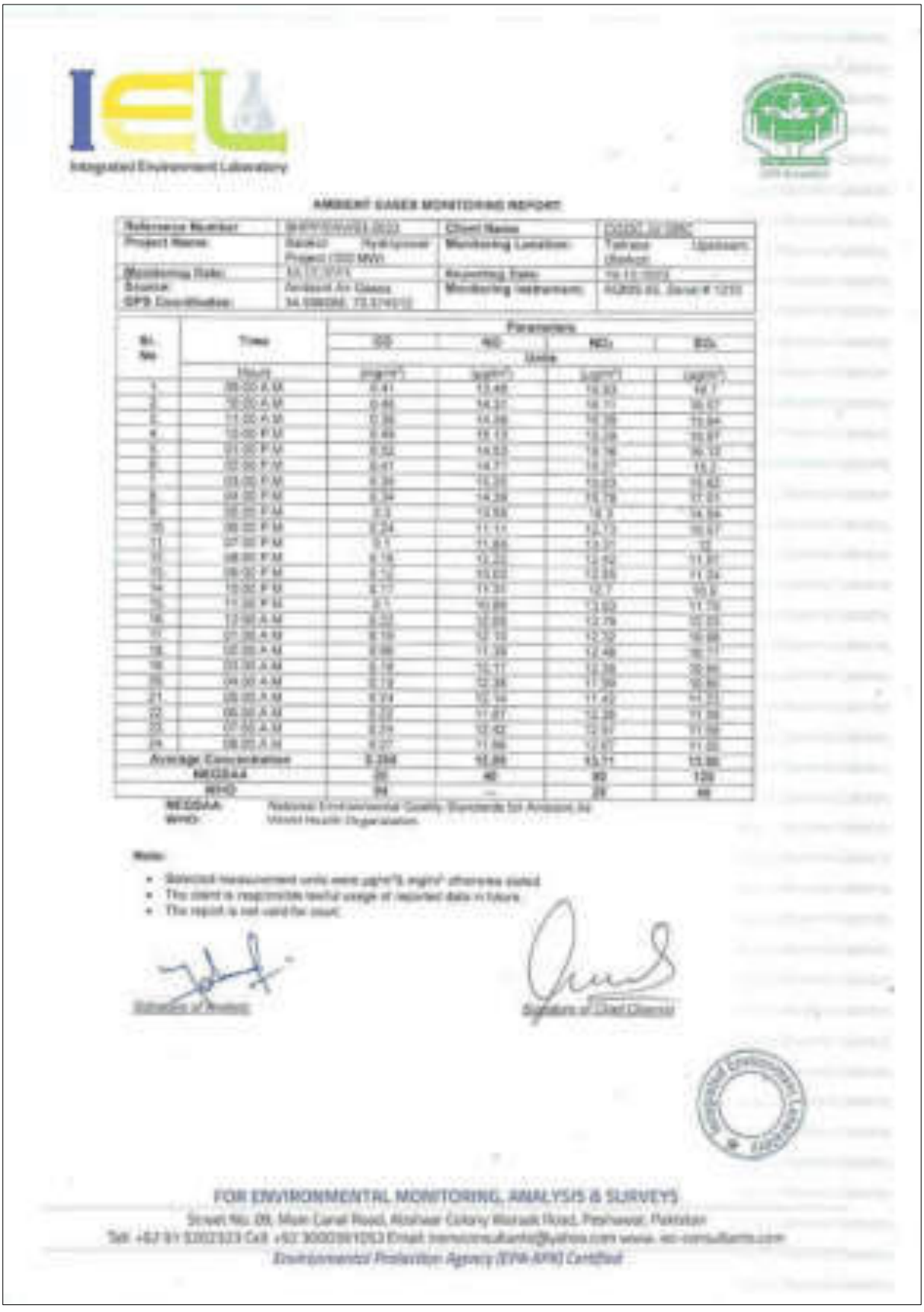
Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abdullah Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5201323 Cell: +92 3005591053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[redacted]	Client Name:	[redacted]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Tehsil Upazilla, District
Monitoring Date:	[redacted]	Reporting Date:	[redacted]
Source:	Ambient Air Gases	Monitoring Instrument:	[redacted]
GPS Coordinates:	[redacted]		

Sr. No	Time	Parameters			
		SO	NO	NO_2	SO_2
		Units			
	Hours	µg/m³	µg/m³	µg/m³	µg/m³
1	09:00 A.M	0.41	13.48	13.83	14.7
2	10:00 A.M	0.46	14.37	14.71	16.07
3	11:00 A.M	0.36	14.06	14.36	15.94
4	12:00 P.M	0.49	15.13	15.39	16.97
5	01:00 P.M	0.33	14.63	14.96	16.12
6	02:00 P.M	0.41	14.71	15.07	15.7
7	03:00 P.M	0.39	13.28	13.63	15.42
8	04:00 P.M	0.34	14.29	14.78	17.01
9	05:00 P.M	0.3	13.58	14.3	14.94
10	06:00 P.M	0.24	11.11	11.73	13.67
11	07:00 P.M	0.1	11.68	12.07	12
12	08:00 P.M	0.16	12.23	12.62	11.91
13	09:00 P.M	0.13	13.02	13.38	11.24
14	10:00 P.M	0.11	11.31	12.7	10.9
15	11:00 P.M	0.1	10.89	13.03	11.19
16	12:00 A.M	0.12	12.05	12.79	12.03
17	01:00 A.M	0.19	12.15	12.72	12.68
18	02:00 A.M	0.08	11.39	12.48	10.71
19	03:00 A.M	0.14	12.11	12.39	10.89
20	04:00 A.M	0.13	12.34	12.59	10.86
21	05:00 A.M	0.11	10.14	11.42	11.03
22	06:00 A.M	0.12	11.07	12.28	11.09
23	07:00 A.M	0.21	12.12	12.61	11.09
24	08:00 A.M	0.27	11.56	12.67	11.05
Average Concentration		0.244	12.66	13.11	12.86
NEQSAA		80	40	80	120
WHO		40	--	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³(1 mg/m³ otherwise stated
- The client is responsible lawful usage of reported data in future
- The report is not valid for court

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000391053 Email: [redacted] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	CGGC JV GPC
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	GPC Camp Office (Tarighat)
Monitoring Date:	13-12-2023	Reporting Date:	15-12-2023
Source: GPS Coordinates:	Ambient Air Gases 34.584555, 73.272478	Monitoring Instrument:	AGMS 60, Serial # 7210

Sr. No.	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	µg/m³	µg/m³	µg/m³	µg/m³
1	09:00 A.M	0.39	6.94	9.72	10.65
2	10:00 A.M	0.4	7.19	9.8	10.98
3	11:00 A.M	0.32	7.49	10.17	9.83
4	12:00 P.M	0.43	8.61	9.68	9.56
5	01:00 P.M	0.46	8.21	8.56	10.11
6	02:00 P.M	0.35	8.79	9.08	9.78
7	03:00 P.M	0.33	8.71	8.42	9.81
8	04:00 P.M	0.38	7.8	8.97	11
9	05:00 P.M	0.24	7.03	8.68	8.83
10	06:00 P.M	0.3	6.8	9.21	8.32
11	07:00 P.M	0.19	7.04	9.79	10.16
12	08:00 P.M	0.23	7.97	8.8	10.47
13	09:00 P.M	0.18	8.72	9.03	9.94
14	10:00 P.M	0.23	-	9.19	9.65
15	11:00 P.M	0.19	8.97	10.61	10.4
16	12:00 A.M	0.29	7.75	9.29	10.78
17	01:00 A.M	0.25	7.89	8.8	9.71
18	02:00 A.M	0.17	7.07	8.59	9.42
19	03:00 A.M	0.24	6.85	8.94	9.2
20	04:00 A.M	0.25	6.07	8.47	9.81
21	05:00 A.M	0.3	7.53	7.3	8.98
22	06:00 A.M	0.19	7.35	8.76	10.14
23	07:00 A.M	0.3	8.1	9.09	10.42
24	08:00 A.M	0.23	7.22	9.13	10.3
Average Concentration		**0.28**	**7.74**	**9.19**	**10.01**
NEQSAA		**80**	**40**	**80**	**120**
WHO		**04**	**---**	**40**	**40**

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Selected measurement units were µg/m³ & mg/m³ otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Signature of CWE Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Minhaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5202323 Cell: +92 3005891053 Email: iwesconsultants@yahoo.com www.iel-consultants.com
Environmental Protection Agency (EPA) KPK Certified

Integrated Environment Laboratory

AMBIENT GASES MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Colony Area (Shaghai)
Monitoring Date:	13.11.2023	Reporting Date:	16.12.2023
Source:	Ambient Air Gases	Monitoring Instrument:	RGMS 03, Serial # 1318
GPS Coordinates:	34.587775, 73.565228		

Sr. No	Time	Parameters			
		SO2	NO	NO2	SO2
		Unit			
	Hours	(ug/m³)	(ug/m³)	(ug/m³)	(ug/m³)
1	09:00 A.M	9.5	10.27	12.64	13.35
2	10:00 A.M	8.98	11.17	12.02	12.23
3	11:00 A.M	9.47	11.19	12.49	11.5
4	12:00 P.M	9.56	11.54	11.4	11.03
5	01:00 P.M	9.61	11.34	11.21	11.78
6	02:00 P.M	9.5	11.52	11.34	10.68
7	03:00 P.M	9.48	12.06	11.74	11.48
8	04:00 P.M	9.45	11.2	11.85	12.67
9	05:00 P.M	9.41	9.26	11.47	10.9
10	06:00 P.M	9.27	8.13	8.32	8.52
11	07:00 P.M	9.26	8.91	8.4	10.06
12	08:00 P.M	9.21	9.24	8.51	9.72
13	09:00 P.M	9.28	10.04	8.94	9.29
14	10:00 P.M	9.23	8.31	8.76	8.91
15	11:00 P.M	9.25	7.9	8.62	9.8
16	12:00 A.M	9.25	9.08	8.57	10.08
17	01:00 A.M	9.26	9.13	8.91	9.91
18	02:00 A.M	9.21	8.4	8.57	8.82
19	03:00 A.M	9.21	10.19	8.45	8.8
20	04:00 A.M	9.23	9.4	8.38	8.91
21	05:00 A.M	9.27	9.16	7.91	9.28
22	06:00 A.M	9.29	9.09	8.27	9.64
23	07:00 A.M	9.27	9.44	9.64	9.73
24	08:00 A.M	9.3	9.58	8.79	9.6
Average Concentration		9.37	9.78	9.81	10.26
NEQSAA		80	40	80	120
WHO		94	--	25	40

NEQSAA: National Environmental Quality Standards for Ambient Air
WHO: World Health Organization

Note:

- Detected measurement units were µg/m³& mg/m³ otherwise stated
- The client is responsible lawful usage of reported data in future
- The report is not valid for court

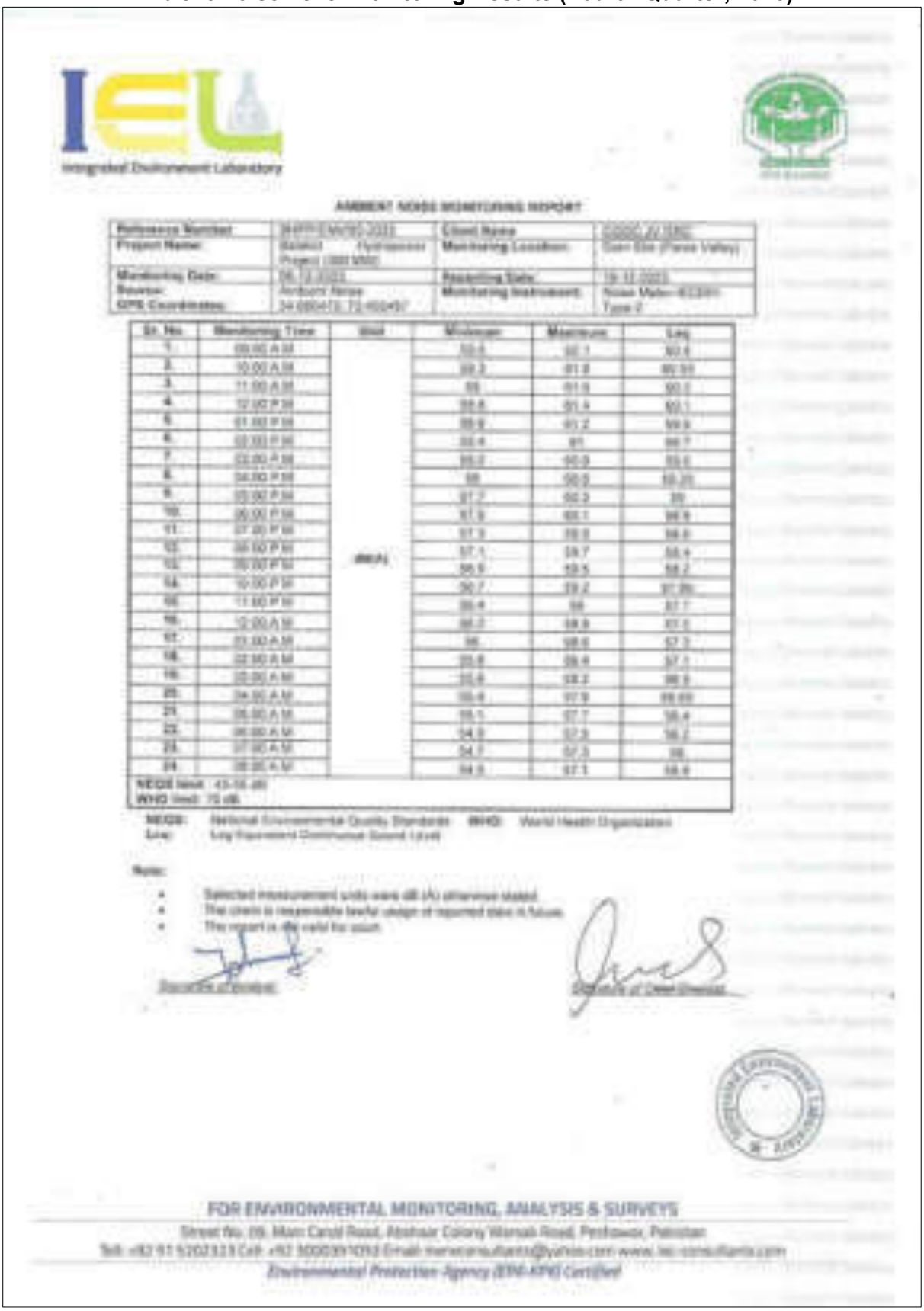
Signature of Analyst

Signature of Client Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92-91-5202323 Cell: +92-3000391053 Email: [illegible] www.iel-consultants.com
Environmental Protection Agency (EPA) KPK Certified

Ambient Noise Level Monitoring Results (Fourth Quarter, 2023)



Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Dam Site (Pehra Valley)
Monitoring Date:	06.12.2023	Reporting Date:	19.12.2023
Source: GPS Coordinates:	Ambient Noise 34.680473, 73.493497	Monitoring Instrument:	Noise Meter-[illegible] Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	53.6	97.1	93.6
2.	10:00 A.M		89.3	91.8	90.59
3.	11:00 A.M		88	91.6	90.0
4.	12:00 P.M		89.8	91.4	90.1
5.	01:00 P.M		89.6	91.2	89.9
6.	02:00 P.M		89.4	91	89.7
7.	03:00 A.M		89.2	90.8	89.5
8.	04:00 P.M		89	90.6	89.25
9.	05:00 P.M		87.7	90.2	89
10.	06:00 P.M		87.6	90.1	88.9
11.	07:00 P.M		87.5	89.9	88.8
12.	08:00 P.M		87.1	89.7	88.4
13.	09:00 P.M		86.8	89.5	88.2
14.	10:00 P.M		86.7	89.2	87.95
15.	11:00 P.M		86.4	89	87.7
16.	12:00 A.M		86.2	88.8	87.5
17.	01:00 A.M		86	88.6	87.3
18.	02:00 A.M		85.8	88.4	87.1
19.	03:00 A.M		85.6	88.2	86.9
20.	04:00 A.M		85.4	87.9	86.69
21.	05:00 A.M		85.1	87.7	86.4
22.	06:00 A.M		84.8	87.5	86.2
23.	07:00 A.M		84.7	87.3	86
24.	08:00 A.M		84.5	87.1	85.8

NECS limit: 45-55 dB
WHO limit: 70 dB

NECS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is [illegible] valid for court.

Signature of Analyst

Signature of Client Director

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5202323 Cell: +92 3005391013 E-mail: ielconsultants@yahoo.com www.iel-consultants.com
Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	[illegible]
Monitoring Date:	[illegible]	Reporting Date:	[illegible]
Source: GPS Coordinates:	Ambient Noise [illegible]	Monitoring Instrument:	Nyxis Make: [illegible] Type 2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1	09:00 A.M	dB(A)	90.6	92.1	91.8
2	10:00 A.M		90.3	92.8	91.99
3	11:00 A.M		90	92.6	91.3
4	12:00 P.M		89.8	92.4	91.1
5	01:00 P.M		90.6	92.2	91.9
6	02:00 P.M		89.4	92	89.7
7	03:00 P.M		90.2	91.8	90.5
8	04:00 P.M		89	91.5	90.25
9	05:00 P.M		88.7	91.3	90
10	06:00 P.M		88.3	91.1	89.5
11	07:00 P.M		87.3	89.9	88.6
12	08:00 P.M		87.1	89.7	88.4
13	09:00 P.M		89.8	90.5	88.2
14	10:00 P.M		89.7	90.3	87.99
15	11:00 P.M		88.4	89	87.7
16	12:00 A.M		88.2	88.9	87.6
17	01:00 A.M		88	88.6	87.3
18	02:00 A.M		89.8	89.4	87.1
19	03:00 A.M		89.6	90.2	88.9
20	04:00 A.M		89.4	77.9	88.93
21	05:00 A.M		89.1	87.7	88.4
22	06:00 A.M		89.8	87.5	88.2
23	07:00 A.M		34.7	87.3	88
24	08:00 A.M		94.5	87.1	88.8
NEQS limit: 45-55 dB WHO limit: 70 dB					

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Saturated measurement units were dB (A) otherwise stated
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court

Signature of Analyst

Signature of CMR Director

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000391053 Email: iecconsultants@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	IEL/PP/EM/SU/2023	Client Name:	CASE OF DAC
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adit-3 (Channel)
Monitoring Date:	07-12-2023	Reporting Date:	19-12-2023
Source: GPS Coordinates:	Ambient Noise 34.630087, 73.417929	Monitoring Instrument:	Noise Meter (ECM01 Type-I)

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1	01:00 A.M	dB(A)	63.6	63.6	63.60
2	10:00 A.M		62.4	63.2	61.8
3	11:00 A.M		62.1	63	61.55
4	12:00 P.M		59.9	64.8	61.25
5	01:00 P.M		58.7	62.6	61.15
6	02:00 P.M		59.6	62.4	60.95
7	03:00 P.M		58.2	62.3	60.75
8	04:00 P.M		59.1	61.9	60.5
9	05:00 P.M		57.6	60.7	59.25
10	06:00 P.M		57.6	60.6	58.55
11	07:00 P.M		57.4	60.3	58.65
12	08:00 P.M		57.2	60.1	58.65
13	09:00 P.M		57	59.9	58.45
14	10:00 P.M		56.6	59.6	58.2
15	11:00 P.M		46.7	49.6	48.15
16	12:00 A.M		46.4	49.5	47.65
17	01:00 A.M		46.2	49.1	47.65
18	02:00 A.M		46	49.6	47.45
19	03:00 A.M		46.8	48.7	47.55
20	04:00 A.M		46.4	48.4	47
21	05:00 A.M		46.3	48.2	46.75
22	06:00 A.M		46.1	48	46.55
23	07:00 A.M		46.6	47.8	46.75
24	08:00 A.M		46.7	48.4	46.55

NEQS limit: 45-55 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- The client is responsible for lawful usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Rishaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3003591053 Email: ielenvironmentconsultants@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Adit-3 (Khuiratta)
Monitoring Date:	06.12.2023	Reporting Date:	19.12.2023
Source: GPS Coordinates:	Ambient Noise 34.616253,73.368387	Monitoring Instrument:	Noise Meter (ECO01 Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1	04:00 A.M	dB(A)	51.9	69.9	60.2
2	10:00 A.M		50.3	70.9	59.1
3	11:00 A.M		49	71.9	70.44
4	12:00 P.M		55.8	67.7	59.6
5	01:00 P.M		54	65.7	64.33
6	02:00 P.M		55.5	69.8	67.55
7	03:00 P.M		75.9	75	71.69
8	04:00 P.M		59	68.4	68.2
9	05:00 P.M		54.5	66.8	65.65
10	06:00 P.M		47	46.9	47.55
11	07:00 P.M		45.4	41.4	46.4
12	09:00 P.M		46	44.9	46.8
13	09:00 P.M		45.1	53	49.05
14	10:00 P.M		49.9	50.1	49.73
15	11:00 P.M		47.1	51.7	49.4
16	12:00 A.M		48.4	54.3	51.55
17	01:00 A.M		46.2	47	46.73
18	02:00 A.M		48.3	52.2	46.9
19	03:00 A.M		48	51.9	50.25
20	04:00 A.M		47.3	46.8	49.1
21	05:00 A.M		46.1	48.3	47.2
22	06:00 A.M		49.5	52.3	48.95
23	07:00 A.M		47.2	50.1	48.85
24	08:00 A.M		49.4	50.8	50.15
NEQS limit: 55-55 dB WHO limit: 70 dB					

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Leq Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- The standard recommended lawful usage of reported data is future.
- This report is not valid for court.

Signature of Lab Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5253323 Cell: +92 3000391053 Email: iremconsultants@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Powerhouse (Balkot)
Monitoring Date:	[illegible]	Reporting Date:	[illegible]
Source: GPS Coordinates:	Ambient Noise 34.902972, 73.377149	Monitoring Instrument:	Noise Meter (CESVI) Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1	09:00 A.M	dB(A)	54.5	57.4	55.99
2	10:00 A.M		54.2	57.2	55.73
3	11:00 A.M		54.1	57	55.55
4	12:00 P.M		53.9	56.8	55.38
5	01:00 P.M		53.6	56.5	55.05
6	02:00 P.M		53.4	56.3	54.86
7	03:00 P.M		53.2	56.1	54.65
8	04:00 P.M		53	55.9	54.45
9	05:00 P.M		52.8	55.7	54.25
10	06:00 P.M		50.5	53.3	51.95
11	07:00 P.M		50.2	52.7	51.73
12	08:00 P.M		50.1	52	51.53
13	09:00 P.M		49.9	51.8	51.35
14	10:00 P.M		49.7	51.5	51.13
15	11:00 P.M		49.6	51.4	51.03
16	12:00 A.M		50.1	51.1	50.63
17	01:00 A.M		50	50.9	50.43
18	02:00 A.M		49.8	50.7	50.25
19	03:00 A.M		49.8	50.5	50.09
20	04:00 A.M		49.4	50.2	49.8
21	05:00 A.M		49.1	50	49.54
22	06:00 A.M		49.8	49.8	49.55
23	07:00 A.M		50	50.8	50.6
24	08:00 A.M		49.8	50	49.7

NEQS limit: 40-55 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise noted.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Technician / Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Main Canal Road, Abdulsar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3030391053 Email: iecconsultants@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-EPD) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Tehsil: [illegible] District: Balakot
Monitoring Date:	19-12-2023	Reporting Date:	19.12.2023
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter (ROHS-Type-I)
GPS Coordinates:	[illegible]		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1	10:00 A.M	dB(A)	69.1	87.7	87
2	12:00 A.M		68.1	89.7	88.5
3	11:00 A.M		87.8	90.7	89.23
4	12:00 P.M		84.2	88.9	88.4
5	01:00 P.M		89.5	91	89.75
6	02:00 P.M		80.5	91.1	91
7	03:00 P.M		89.7	91.8	90.75
8	04:00 P.M		87.9	98.2	88
9	05:00 P.M		46.0	90.3	48.4
10	06:00 P.M		83.5	84.4	83.85
11	07:00 P.M		91.3	93.5	92.1
12	08:00 P.M		89.8	84.1	92.5
13	09:00 P.M		91	99.5	94.75
14	10:00 P.M		99.5	99.5	99.45
15	11:00 P.M		83	97.2	89.1
16	12:00 A.M		95.3	99.8	97.55
17	01:00 A.M		91.2	93.5	91.69
18	02:00 A.M		81.4	97.8	84.5
19	03:00 A.M		94.5	97	93.85
20	04:00 A.M		83.2	84.4	85.8
21	05:00 A.M		92	93.8	92.9
22	06:00 A.M		81.5	97.8	99.69
23	07:00 A.M		85	94.8	93.75
24	08:00 A.M		93.3	96.8	97.84

NEQS limit: 42 dB(A)
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- The client is responsible lawful usage of reported data in future.
- This report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abdhaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3020891053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	GRC Camp Office (Garlighar)
Monitoring Date:	12-12-2023	Reporting Date:	17.12.2023
Source: GPS Coordinates:	Ambient Noise 34.584662, 73.372878	Monitoring Instrument:	Noise Meter (BOSH) Type-2

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	57.3	62.0	58.9
2.	10:00 A.M		59.1	62.5	60.8
3.	11:00 A.M		58.9	63.5	61.19
4.	12:00 P.M		59.2	64.1	67.3
5.	01:00 P.M		61.5	63.8	62.69
6.	02:00 P.M		61.6	63.9	62.9
7.	03:00 P.M		60.7	64.5	62.65
8.	04:00 P.M		59.6	61	60.9
9.	05:00 P.M		60.5	62.1	61.3
10.	06:00 P.M		63.9	67.2	64.56
11.	07:00 P.M		63.3	67.7	64
12.	08:00 P.M		61.9	66.6	64.4
13.	09:00 P.M		57	61.5	59.65
14.	10:00 P.M		56.5	58.4	57.55
15.	11:00 P.M		54	60	57
16.	12:00 A.M		56.3	60.9	59.45
17.	01:00 A.M		52.2	56.2	53.75
18.	02:00 A.M		52.4	58.6	56.5
19.	03:00 A.M		55.9	59.9	57.85
20.	04:00 A.M		54.2	57.2	55.7
21.	05:00 A.M		53	56.6	54.8
22.	06:00 A.M		52.4	55.8	54.55
23.	07:00 A.M		54	57.3	55.65
24.	08:00 A.M		56.3	64.2	61.75

NEQS limit: 55.65 dB
WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- The client is responsible lawful usage of recorded data in future.
- The report is not valid for court.

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Ittehad Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5203323 Cell: +92 3000591053 Email: iecconsultants@yahoo.com www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

AMBIENT NOISE MONITORING REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Monitoring Location:	Colony Area (Garighar)
Monitoring Date:	13.12.2023	Reporting Date:	[illegible]
Source: GPS Coordinates:	Ambient Noise 34.597775, 73.368334	Monitoring Instrument:	Noise Meter SC2021 Type-II

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:00 A.M	dB(A)	56.8	68	67.3
2.	10:00 A.M		59.4	70	68.7
3.	11:00 A.M		60.1	71	69.55
4.	12:00 P.M		64.8	68.8	68.1
5.	01:00 P.M		70.8	71.5	71.05
6.	02:00 P.M		71.2	71.4	71.3
7.	03:00 P.M		70	72.1	71.05
8.	04:00 P.M		68.1	68.8	68.3
9.	05:00 P.M		63.8	65.8	64.75
10.	06:00 P.M		46.1	48	47.05
11.	07:00 P.M		44.8	46.5	45.5
12.	08:00 P.M		44.1	47.7	45.9
13.	09:00 P.M		44.3	52.1	48.15
14.	10:00 P.M		46.5	49.2	48.85
15.	11:00 P.M		46.2	50.8	48.5
16.	12:00 A.M		49.8	53.4	50.55
17.	01:00 A.M		44.4	46.1	45.25
18.	02:00 A.M		42.6	51.4	46
19.	03:00 A.M		46.1	50.8	48.35
20.	04:00 A.M		46.4	48	47.2
21.	05:00 A.M		46.3	47.4	46.3
22.	06:00 A.M		44.1	51.4	48.05
23.	07:00 A.M		46.3	48.2	47.75
24.	08:00 A.M		46.4	50	48.25

NEQS limit : 55-10 dB
WHO limit : 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization
Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated
- The client is responsible lawful usage of reported data or values
- This report is [illegible] valid for court

Signature of Analyst

Signature of Lab Incharge

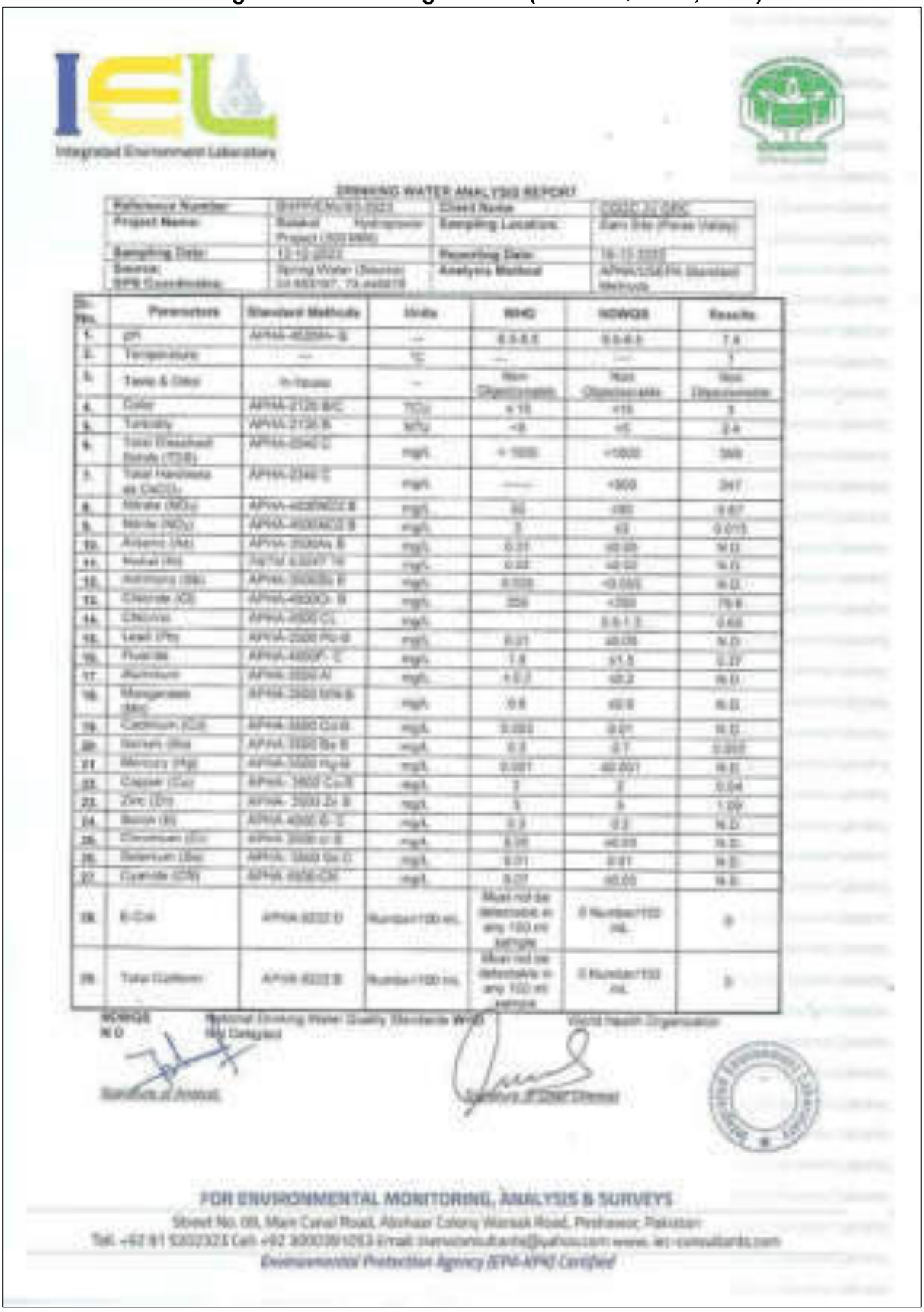
FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3005391053 Email: iremconsultants@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Drinking Water Monitoring Results (Fourth Quarter, 2023)



Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	[illegible]
Sampling Date:	12.12.2023	Reporting Date:	[illegible]
Source: GPS Coordinates:	Spring Water (Source) [illegible]	Analysis Method	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	NHG	NDWQS	Results
1.	pH	APHA-4500H+ B	--	6.5-8.5	6.5-8.5	7.4
2.	Temperature	--	°C	--	--	7
3.	Taste & Odor	In-house	--	Non Objectionable	Non Objectionable	Non Objectionable
4.	Color	APHA-2120 B/C	TCU	≤ 15	≤15	3
5.	Turbidity	APHA-2130 B	NTU	<5	≤5	2.4
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	≤ 1000	≤1000	369
7.	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	------	≤500	247
8.	Nitrate (NO_3)	APHA-4500NO3 B	mg/L	50	≤50	0.67
9.	Nitrite (NO_2)	APHA-4500NO2 B	mg/L	3	≤3	0.015
10.	Arsenic (As)	APHA- 3500As B	mg/L	0.01	≤0.05	N.D
11.	Nickel (Ni)	[illegible]	mg/L	0.02	≤0.02	N.D.
12.	Antimony (Sb)	APHA- [illegible]	mg/L	0.020	≤0.020	N.D.
13.	Chloride (Cl)	APHA-4500Cl- B	mg/L	250	≤250	79.8
14.	Chlorine	APHA-4500 Cl	mg/L		0.6-1.2	0.68
15.	Lead (Pb)	APHA-3500 Pb B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA-4500F- C	mg/L	1.5	≤1.5	0.27
17.	Aluminum	APHA- 3500 Al	mg/L	0.2	≤0.2	N.D.
18.	Manganese (Mn)	APHA-3500 Mn B	mg/L	0.5	≤0.5	N.D.
19.	Cadmium (Cd)	APHA-3500 Cd B	mg/L	0.003	≤0.01	N.D.
20.	Barium (Ba)	APHA-3500 Ba B	mg/L	0.7	≤0.7	0.003
21.	Mercury (Hg)	APHA-3500 Hg B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA- 3500 Cu B	mg/L	2	≤2	0.04
23.	Zinc (Zn)	APHA- 3500 Zn B	mg/L	5	≤5	1.09
24.	Boron (B)	APHA-4500 B- C	mg/L	0.3	≤0.3	N.D.
25.	Chromium (Cr)	APHA- 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	≤0.01	N.D.
27.	Cyanide (CN)	APHA-4500-CN	mg/L	0.07	≤0.05	N.D.
28.	E-Coli	APHA-9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	Total Coliform	APHA-9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
N.D: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5822323 Cell: +92 3003391053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Dam Site (Pehur Valley)
Sampling Date:	[illegible]	Reporting Date:	19-12-2023
Source: EPE Coordinates:	Tap Water (End User); 34.550833, 73.402772	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	APHA-4500H+ B	--	6.5-8.5	6.5-8.5	7.7
2.	Temperature	---	°C	---	---	8
3.	Taste & Odor	In-House	--	Non-Objectionable	Non-Objectionable	Non-Objectionable
4.	Color	APHA-2120 B/C	TCU	≤ 15	≤15	3.5
5.	Turbidity	APHA-2130 B	NTU	<5	<5	3.1
6.	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	376
7.	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	------	<500	262
8.	Nitrate (NO_3)	APHA-4500-NO3 B	mg/L	50	≤50	0.65
9.	Nitrite (NO_2)	APHA-4500-NO2 B	mg/L	3	≤3	0.017
10.	Arsenic (As)	APHA-3500-As B	mg/L	0.01	≤0.05	N.D.
11.	Boron (B)	ASTM D3561-16	mg/L	0.5	≤0.3	N.D.
12.	Antimony (Sb)	APHA-3500Sb B	mg/L	0.005	≤0.005	N.D.
13.	Chloride (Cl)	APHA-4500Cl- B	mg/L	250	<250	77.1
14.	Chlorine	APHA-4500 CL	mg/L		0.5-1.5	0.6
15.	Lead (Pb)	APHA-3500 Pb-B	mg/L	0.01	≤0.05	N.D.
16.	Fluoride	APHA-4500F- C	mg/L	1.5	≤1.5	0.42
17.	Aluminum	APHA-3500 Al	mg/L	0.9-2	≤0.2	N.D.
18.	Manganese (Mn)	APHA-3500 Mn-B	mg/L	0.5	≤0.5	N.D.
19.	Cadmium (Cd)	APHA-3500 Cd-B	mg/L	0.003	0.01	N.D.
20.	Barium (Ba)	APHA-3500 Ba B	mg/L	0.3	0.7	0.278
21.	Mercury (Hg)	APHA-3500 Hg-B	mg/L	0.001	≤0.001	N.D.
22.	Copper (Cu)	APHA- 3500 Cu-B	mg/L	2	1	N.D.
23.	Zinc (Zn)	APHA- 3500 Zn B	mg/L	3	5	1.2
24.	Boron (B)	APHA 4500-B- C	mg/L	0.3	0.3	N.D.
25.	Chromium (Cr)	APHA- 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26.	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D.
27.	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D.
28.	E-Coli	APHA 9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	Total Coliform	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
ND: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5812333 Cell: +92 3003081053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name	Balakot Hydropower Project (300 MW)	Sampling Location	[illegible]
Sampling Date	12.12.2023	Reporting Date	19.12.2023
Source: GPS Coordinates:	[illegible]	Analysis Method	[illegible]

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1.	pH	[illegible]	---	[illegible]	[illegible]	7.7
2.	Temperature	---	°C	---	---	7
3.	Taste & Odor	In House	---	Non Objectionable	Non Objectionable	Non Objectionable
4.	Color	[illegible]	TCU	[illegible]	[illegible]	N
5.	Turbidity	[illegible]	NTU	[illegible]	[illegible]	3.5
6.	Total Dissolved Solids (TDS)	[illegible]	mg/L	[illegible]	[illegible]	394
7.	Total Hardness as $CaCO_3$	[illegible]	mg/L	[illegible]	[illegible]	238
8.	Nitrate (NO_3)	[illegible]	mg/L	[illegible]	[illegible]	1.28
9.	Nitrite (NO_2)	[illegible]	mg/L	[illegible]	[illegible]	0.019
10.	Arsenic (As)	[illegible]	mg/L	[illegible]	[illegible]	N.D
11.	Nickel (Ni)	[illegible]	mg/L	[illegible]	[illegible]	0.008
12.	Antimony (Sb)	[illegible]	mg/L	[illegible]	[illegible]	N.D
13.	Chloride (Cl)	[illegible]	mg/L	[illegible]	[illegible]	139
14.	Chlorine	[illegible]	mg/L	[illegible]	[illegible]	0.48
15.	Lead (Pb)	[illegible]	mg/L	[illegible]	[illegible]	N.D.
16.	Fluoride	[illegible]	mg/L	[illegible]	[illegible]	0.51
17.	Aluminum	[illegible]	mg/L	[illegible]	[illegible]	N.D.
18.	Manganese (Mn)	[illegible]	mg/L	[illegible]	[illegible]	N.D.
19.	Cadmium (Cd)	[illegible]	mg/L	[illegible]	[illegible]	N.D.
20.	Barium (Ba)	[illegible]	mg/L	[illegible]	[illegible]	0.17
21.	Mercury (Hg)	[illegible]	mg/L	[illegible]	[illegible]	N.D.
22.	Copper (Cu)	[illegible]	mg/L	[illegible]	[illegible]	0.048
23.	Zinc (Zn)	[illegible]	mg/L	[illegible]	[illegible]	1.02
24.	Boron (B)	[illegible]	mg/L	[illegible]	[illegible]	N.D
25.	Chromium (Cr)	[illegible]	mg/L	[illegible]	[illegible]	N.D
26.	Selenium (Se)	[illegible]	mg/L	[illegible]	[illegible]	N.D
27.	Cyanide (CN)	[illegible]	mg/L	[illegible]	[illegible]	N.D.
28.	E-Coli	[illegible]	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29.	Total Coliform	[illegible]	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
N.D: Not Detected

Signature of Analyst: Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Ibrahim Colony Warsak Road, Peshawar, Pakistan.
Tel: +92 91 5203323 Cell: +92 3003391053 Email: [illegible] www.[illegible].com

Environmental Protection Agency (EPA #NO Certified)

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-1 (Tap)
Sampling Date:	13-12-2023	Reporting Date:	19-12-2023
Source:	Tap Water (End User)	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:	34.83125, 73.42597		

Sr. No	Parameters	Standard Methods	Units	WHO	NEWQS	Results
1	pH	APHA 4500H+ B	--	6.5-8.5	6.5-8.5	7.5
2	Temperature	---	°C	---	---	9
3	Taste & Odor	In-house	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Odor	APHA 2120 B/C	TCU	5 TU	<TU	4
5	Turbidity	APHA 2130 B	NTU	<5	<5	3.9
6	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	371
7	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	378
8	Nitrate (NO_3)	APHA 4500NO3 B	mg/L	50	500	1.84
9	Nitrite (NO_2)	APHA 4500NO2 B	mg/L	3	<3	0.27
10	Arsenic (As)	APHA 3500As B	mg/L	0.01	0.05	N.D.
11	Mutex (Hg)	ASTM E1647-15	mg/L	0.02	0.02	0.215
12	Antimony (Sb)	APHA 3500Sb B	mg/L	0.006	<0.006	N.D.
13	Chloride (Cl)	APHA 4500Cl- B	mg/L	250	<250	114
14	Chlorine	APHA 4500 CL	mg/L		0.5-1.5	0.56
15	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	<0.05	N.D.
16	Fluoride	APHA 4500F- C	mg/L	1.5	<1.5	0.62
17	Aluminum	APHA 3500 Al	mg/L	+0.2	<0.2	N.D.
18	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.5	<0.5	N.D.
19	Cadmium (Cd)	APHA 3500 Cd B	mg/L	0.003	0.01	N.D.
20	Barium (Ba)	APHA 3500 Ba B	mg/L	0.7	0.7	0.23
21	Mercury (Hg)	APHA 3500 Hg B	mg/L	0.001	<0.001	N.D.
22	Copper (Cu)	APHA- 3500 Cu B	mg/L	2	2	0.271
23	Zinc (Zn)	APHA- 3500 Zn B	mg/L	3	5	1.1
24	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D.
25	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	<0.05	N.D.
26	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D.
27	Cyanide (CN)	APHA 4500 CN	mg/L	0.07	<0.05	N.D.
28	E-Coli	APHA 9222 G	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NEWQS: National Drinking Water Quality Standards WHO: World Health Organization

N.D: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Khyber Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202325 Cell: +92 3000391053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit 2 (Channel)
Sampling Date:	13-12-2023	Reporting Date:	19-12-2023
Source: GPS Coordinates:	Spring Water 34.810181, 73.417185	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NCWQS	Results
1	pH	APHA 4500H+ B	--	6.5-8.5	6.5-8.5	7.2
2	Temperature	--	°C	--	--	8
3	Taste & Odor	Intrinsic	--	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Color	APHA 2120 B/C	TCU	≤ 15	<15	2.2
5	Turbidity	APHA 2130 B	NTU	<5	<5	2.7
6	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	388
7	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	294
8	Nitrate (NO_3)	APHA 4500NO3 B	mg/L	50	500	0.37
9	Nitrite (NO_2)	APHA 4500NO2 B	mg/L	3	45	0.05
10	Arsenic (As)	APHA 3500As B	mg/L	0.01	0.05	N.D
11	Nickel (Ni)	ASTM D3441-16	mg/L	0.02	0.02	N.D
12	Antimony (Sb)	APHA-3500Sb B	mg/L	0.005	<0.006	N.D
13	Chloride (Cl)	APHA-4500Cl- B	mg/L	250	<250	131.8
14	Chlorine	APHA 4500 Cl	mg/L		0.5-1.5	0.72
15	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	0.05	N.D
16	Fluoride	APHA 4500F- C	mg/L	1.5	<1.5	0.68
17	Aluminum	APHA 3500 Al	mg/L	0.2	<0.2	N.D
18	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.5	<0.5	N.D
19	Cadmium (Cd)	APHA 3500 Cd-B	mg/L	0.003	0.01	N.D
20	Barium (Ba)	APHA 3500 Ba B	mg/L	0.7	0.7	0.073
21	Mercury (Hg)	APHA 3500 Hg-B	mg/L	0.001	<0.001	N.D
22	Copper (Cu)	APHA 3500 Cu-B	mg/L	2	2	N.D
23	Zinc (Zn)	APHA 3500 Zn B	mg/L	5	5	1.04
24	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D
25	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	<0.05	N.D
26	Selenium (Se)	APHA 3500 Se C	mg/L	0.01	0.01	N.D
27	Cyanide (CN)	APHA 4500 CN	mg/L	0.01	<0.05	N.D
28	E-Coli	APHA 9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NCWQS: National Drinking Water Quality Standards
WHO: World Health Organization
N.D: Not Detected

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 08, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202324 Cell: +92 3009391083 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	[illegible]
Sampling Date:	[illegible]	Reporting Date:	[illegible]
Source: GPS Coordinates:	[illegible]	Analysis Method:	[illegible]

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1	pH	[illegible]	-	[illegible]	[illegible]	[illegible]
2	Temperature	[illegible]	°C	[illegible]	[illegible]	[illegible]
3	Taste & Odor	[illegible]	-	[illegible]	[illegible]	[illegible]
4	Color	[illegible]	TCU	[illegible]	[illegible]	[illegible]
5	Turbidity	[illegible]	NTU	[illegible]	[illegible]	[illegible]
6	Total Dissolved Solids (TDS)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
7	Total Hardness as $CaCO_3$	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
8	Nitrate (NO_3)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
9	Nitrite (NO_2)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
10	Arsenic (As)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
11	Nickel (Ni)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
12	Antimony (Sb)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
13	Chloride (Cl^-)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
14	Chlorine	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
15	Lead (Pb)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
16	Fluoride	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
17	Aluminum	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
18	Manganese (Mn)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
19	Cadmium (Cd)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
20	Barium (Ba)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
21	Mercury (Hg)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
22	Copper (Cu)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
23	Zinc (Zn)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
24	Boron (B)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
25	Chromium (Cr)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
26	Selenium (Se)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
27	Cyanide (CN)	[illegible]	mg/L	[illegible]	[illegible]	[illegible]
28	E-Coli	[illegible]	Number/100 mL	[illegible]	[illegible]	[illegible]
29	Total Coliform	[illegible]	Number/100 mL	[illegible]	[illegible]	[illegible]

NDWQS: National Drinking Water Quality Standards, WHO: World Health Organization
N.D: Not Detected

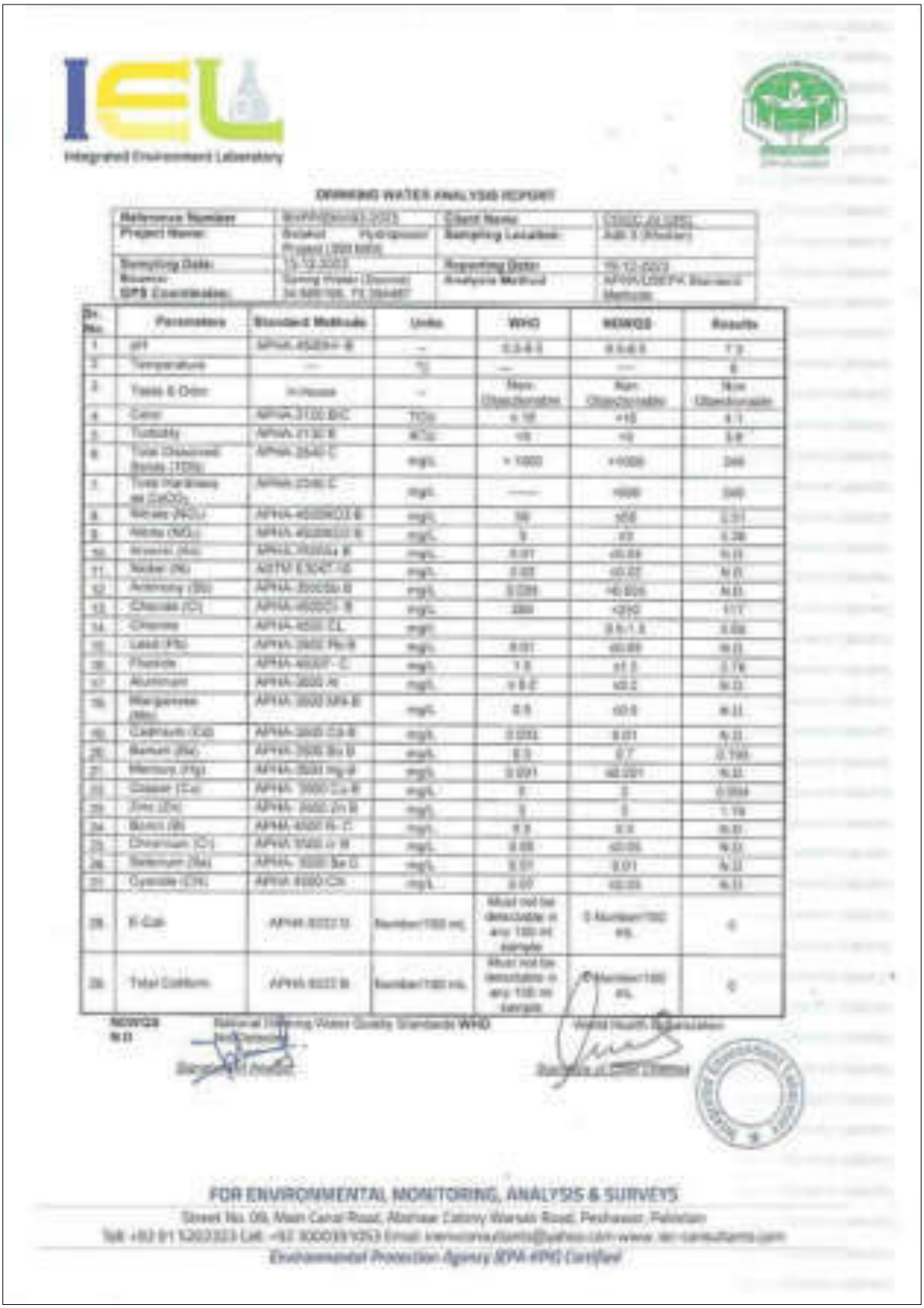
Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92-91-5202323 Cell: +92-3005891053 Email: [illegible] www.iec-consultants.com

Environmental Protection Agency (EPA) Certified



Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot [illegible] Project (300 MW)	Sampling Location:	[illegible]
Sampling Date:	[illegible]	Reporting Date:	[illegible]
Source: GPS Coordinates:	[illegible]	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1	pH	APHA 4500-H+ B	–	[illegible]	[illegible]	[illegible]
2	Temperature	–	°C	–	–	[illegible]
3	Taste & Odor	In-House	–	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Color	APHA 2120 B/C	TCUs	≤ 15	<15	[illegible]
5	Turbidity	APHA 2130 B	NTUs	<5	<5	[illegible]
6	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	[illegible]
7	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	———	<500	[illegible]
8	Nitrate (NO_3)	APHA 4500NO3 B	mg/L	50	≤50	[illegible]
9	Nitrite (NO_2)	APHA 4500NO2 B	mg/L	3	≤3	[illegible]
10	Arsenic (As)	APHA 3500-As B	mg/L	0.01	≤0.05	N.D
11	Nickel (Ni)	ASTM D5047-18	mg/L	0.02	≤0.02	N.D
12	Antimony (Sb)	APHA 3500-Sb B	mg/L	0.020	≤0.006	N.D
13	Chloride (Cl)	APHA 4500Cl- B	mg/L	250	<250	117
14	Chlorine	APHA 4500 CL	mg/L		0.5-1.5	0.68
15	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	≤0.05	N.D
16	Fluoride	APHA 4500F - C	mg/L	1.5	≤1.5	0.74
17	Aluminum	APHA 3500 Al	mg/L	0.2	≤0.2	N.D
18	Manganese (Mn)	APHA 3500 MN-B	mg/L	0.5	≤0.5	N.D
19	Cadmium (Cd)	APHA 3500 Cd B	mg/L	0.003	0.01	N.D
20	Barium (Ba)	APHA 3500 Ba D	mg/L	0.3	0.7	0.749
21	Mercury (Hg)	APHA 3500 Hg-B	mg/L	0.001	≤0.001	N.D
22	Copper (Cu)	APHA 3500 Cu-B	mg/L	2	2	0.004
23	Zinc (Zn)	APHA 3500 Zn B	mg/L	3	3	1.19
24	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D
25	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	≤0.05	N.D
26	Selenium (Se)	APHA 3500 Se D	mg/L	0.01	0.01	N.D
27	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D
28	E-Coli	APHA 9223 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA 9223 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS N.D National Drinking Water Quality Standards WHO World Health Organization

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000391053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA #96) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:		Client Name:	
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	
Sampling Date:		Reporting Date:	
Source:		Analysis Method:	
GPS Coordinates:			

Sr. No.	Parameters	Standard Methods	Units	WHO	NEWQS	Results
1	pH					
2	Temperature					
3	Taste & Odor					
4	Color					
5	Turbidity					
6	Total Dissolved Solids (TDS)					
7	Total Hardness as CaCO3					
8	Nitrate (NO_3)					
9	Nitrite (NO_2)					
10	Arsenic (As)					
11	Nickel (Ni)					
12	Antimony (Sb)					
13	Chloride (Cl)					
14	Chlorine					
15	Lead (Pb)					
16	Fluoride					
17	Aluminum					
18	Manganese (Mn)					
19	Cadmium (Cd)					
20	Barium (Ba)					
21	Mercury (Hg)					
22	Copper (Cu)					
23	Zinc (Zn)					
24	Boron (B)					
25	Chromium (Cr)					
26	Selenium (Se)					
27	Cyanide (CN)					
28	E-Coli					
29	Total Coliform					

NEWQS = National Drinking Water Quality Standards; WHO = World Health Organization

Not Detected

Signature of Analyst

Signature of Lab In-charge

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3005891003 Email: iewconsultants@yahoo.com www.iew-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Powerhouse (Kerkin)
Sampling Date:	13-12-2023	Reporting Date:	16-12-2023
Source: GPS Coordinates:	Spring Water (Stainless) 34.633747, 73.375574	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1	pH	APHA 4500H+ B	-	6.5-8.5	6.5-8.5	7.4
2	Temperature	---	°C	---	---	7
3	Taste & Odor	In House	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Color	APHA 2120 B/C	TCU	≤ 15	<15	2.8
5	Turbidity	APHA 2130 B	NTU	<5	<5	3
6	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	< 1000	<1000	224
7	Total Hardness as $CaCO_3$	APHA 2340 C	mg/L	------	<500	270
8	Nitrate (NO_3)	APHA 4500NO3 B	mg/L	50	≤50	0.48
9	Nitrite (NO_2)	APHA 4500NO2 B	mg/L	3	≤3	0.31
10	Arsenic (As)	APHA 3500As B	mg/L	0.01	≤0.05	N.D.
11	Nickel (Ni)	ASTM D3867-16	mg/L	0.02	≤0.02	N.D.
12	Antimony (Sb)	APHA 3500Sb B	mg/L	0.005	≤0.005	N.D.
13	Chloride (Cl)	APHA 4500Cl- B	mg/L	250	<250	119.2
14	Chlorine	APHA 4500 Cl-	mg/L		0.5-1.5	0.93
15	Lead (Pb)	APHA 3500 Pb B	mg/L	0.01	≤0.05	N.D.
16	Fluoride	APHA 4500F- C	mg/L	1.5	≤1.5	0.89
17	Aluminum	APHA 3500 Al	mg/L	0.2	≤0.2	N.D.
18	Manganese (Mn)	APHA 3500 Mn B	mg/L	0.5	≤0.5	N.D.
19	Cadmium (Cd)	APHA 3500 Cd B	mg/L	0.003	≤0.01	N.D.
20	Barium (Ba)	APHA 3500 Ba B	mg/L	0.7	0.7	0.045
21	Mercury (Hg)	APHA 3500 Hg B	mg/L	0.001	≤0.001	N.D.
22	Copper (Cu)	APHA 3500 Cu B	mg/L	2	2	N.D.
23	Zinc (Zn)	APHA 3500 Zn B	mg/L	3	5	1.08
24	Boron (B)	APHA 4500 B C	mg/L	0.3	0.3	N.D.
25	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	≤0.05	N.D.
26	Selenium (Se)	APHA 3500 Se C	mg/L	0.01	≤0.01	N.D.
27	Cyanide (CN)	APHA 4500-CN	mg/L	0.07	≤0.05	N.D.
28	E-Coli	APHA 9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
N.D: Not Detected

Signature of Analyst

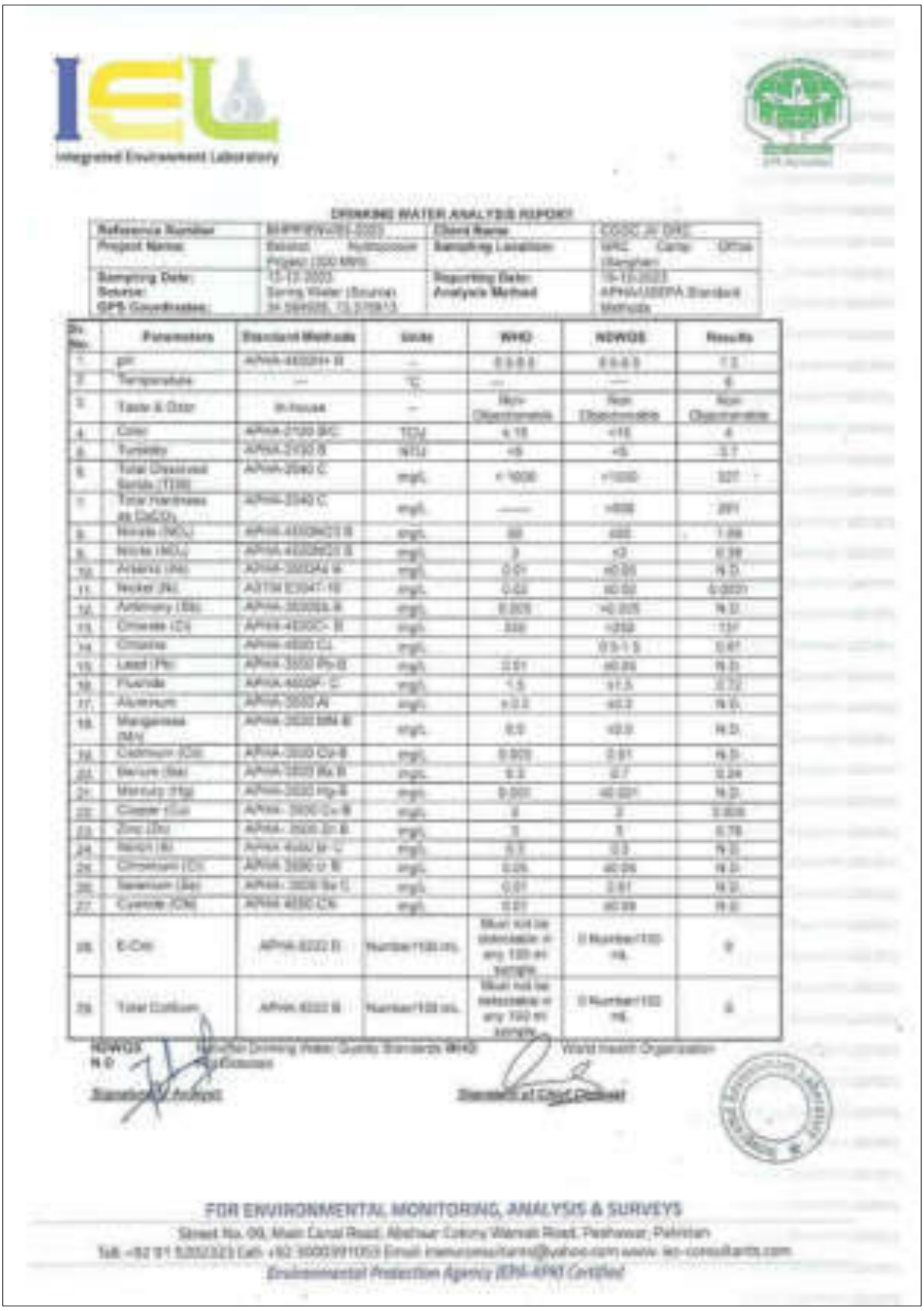
Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 08, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3005391053 Email: [illegible] www.ie-consultants.com

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Electric Hydropower Project (300 MW)	Sampling Location:	WRC Camp Office (Batghari)
Sampling Date:	15-12-2023	Reporting Date:	19-12-2023
Source:	Spring Water (Source)	Analysis Method	APHA/USEPA Standard Methods
GPS Coordinates:	34.594008, 73.378813		

Sr. No.	Parameters	Standard Methods	Units	WHO	NDWQS	Results
1	pH	APHA-4500H+ B	--	6.5-8.5	6.5-8.5	7.5
2	Temperature	---	°C	---	---	6
3	Taste & Odor	In-house	--	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Color	APHA-2120 B/C	TCU	≤ 15	<15	4
5	Turbidity	APHA-2130 B	NTU	<5	<5	3.7
6	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	227
7	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	------	<500	201
8	Nitrate (NO_3)	APHA-4500NO3 B	mg/L	50	500	1.04
9	Nitrite (NO_2)	APHA-4500NO3 B	mg/L	3	<3	0.39
10	Arsenic (As)	APHA-3500As B	mg/L	0.01	<0.05	N.D
11	Nickel (Ni)	ASTM D3947-16	mg/L	0.02	<0.02	0.0031
12	Antimony (Sb)	APHA-3500Sb B	mg/L	0.005	<0.005	N.D
13	Chlorate (Cl_2)	APHA-4500Cl- B	mg/L	300	<250	131
14	Chlorine	APHA-4500 Cl	mg/L		0.5-1.5	0.67
15	Lead (Pb)	APHA-3500 Pb-B	mg/L	0.01	<0.05	N.D
16	Fluoride	APHA-4500F- C	mg/L	1.5	01.5	0.72
17	Aluminum	APHA-3500 Al	mg/L	0.2	<0.2	N.D
18	Manganese (Mn)	APHA-3500 MM B	mg/L	0.5	<0.5	N.D
19	Cadmium (Cd)	APHA-3500 Cd-B	mg/L	0.003	0.01	N.D
20	Barium (Ba)	APHA-3500 Ba B	mg/L	0.3	0.7	0.24
21	Mercury (Hg)	APHA-3500 Hg-B	mg/L	0.001	<0.001	N.D
22	Copper (Cu)	APHA- 3500 Cu-B	mg/L	2	2	0.008
23	Zinc (Zn)	APHA- 3500 Zn B	mg/L	3	5	0.78
24	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D
25	Chromium (Cr)	APHA 3500 Cr B	mg/L	0.05	<0.05	N.D
26	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D
27	Cyanide (CN)	APHA 4500 CN	mg/L	0.01	<0.05	N.D
28	E-Coli	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NDWQS: National Drinking Water Quality Standards WHO: World Health Organization
N.D: Not Detected

Signature of Analyst

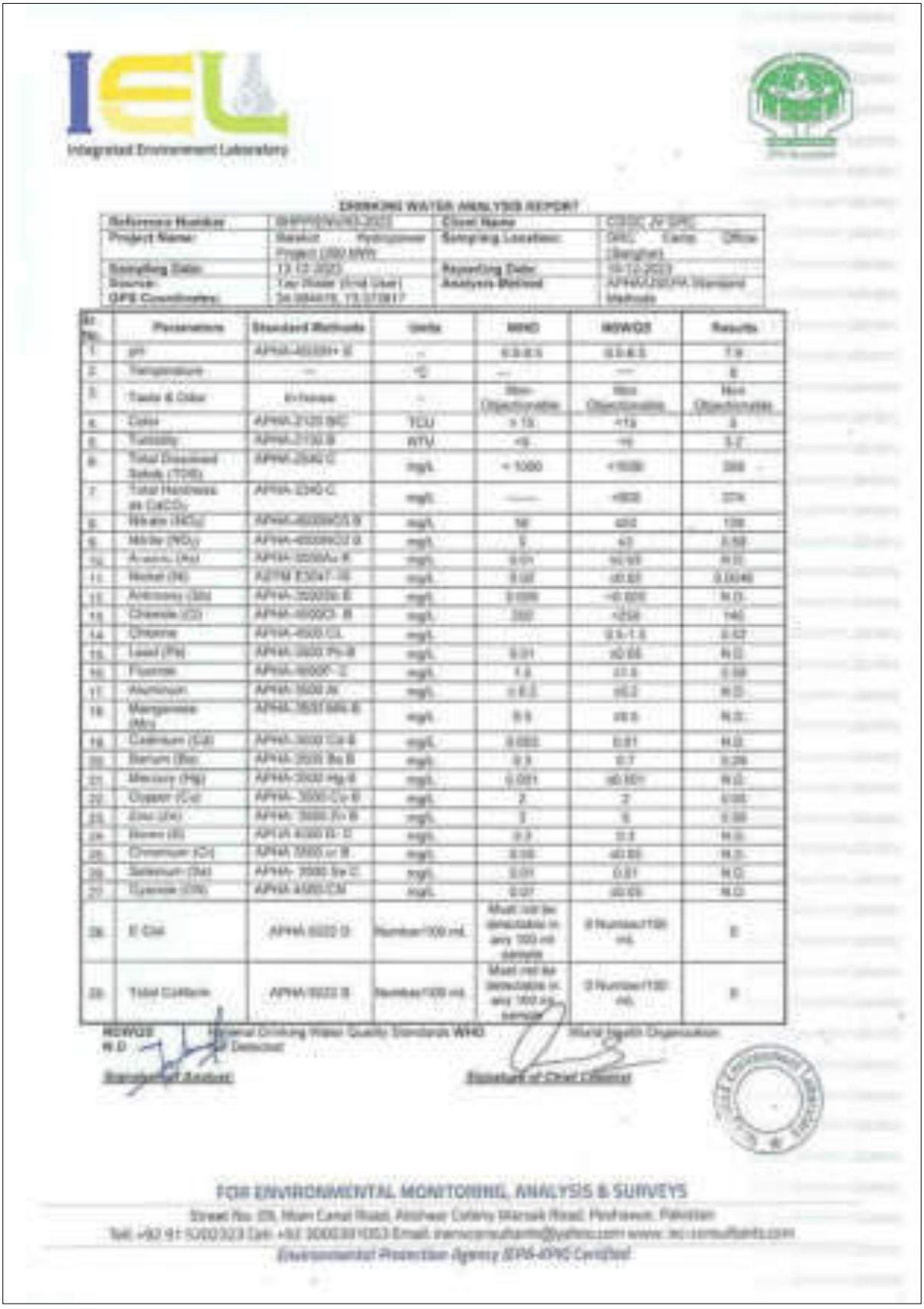
Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abdhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5252323 Cell: +92 3009991053 Email: inenvconsultants@yahoo.com www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified



Integrated Environment Laboratory

DRINKING WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	[illegible]
Sampling Date:	13.12.2023	Reporting Date:	19.12.2023
Source:	Tor River (End User)	Analysis Method:	APHA/USEPA Standard Methods
GPS Coordinates:	34.884678, 73.373817		

Sr. No.	Parameters	Standard Methods	Units	WHO	NSWQS	Results
1	pH	APHA-4500H+ B	-	6.5-8.5	6.5-8.5	7.9
2	Temperature	-	°C	-	-	8
3	Taste & Odor	In-house	-	Non-Objectionable	Non-Objectionable	Non-Objectionable
4	Color	APHA-2120 B/C	TCU	< 15	<15	3
5	Turbidity	APHA-2130 B	NTU	<5	<5	3.7
6	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	< 1000	<1000	399
7	Total Hardness as $CaCO_3$	APHA-2340 C	mg/L	------	<500	224
8	Nitrate (NO_3)	APHA-4500NO3 B	mg/L	50	400	108
9	Nitrite (NO_2)	APHA-4500NO2 B	mg/L	3	<3	0.59
10	Arsenic (As)	APHA-3500As B	mg/L	0.01	<0.05	N.D.
11	Nickel (Ni)	ASTM D3557-12	mg/L	0.02	<0.02	0.0246
12	Antimony (Sb)	APHA-3500Sb B	mg/L	0.005	<0.005	N.D.
13	Chloride (Cl)	APHA-4500Cl- B	mg/L	250	<250	140
14	Chlorine	APHA-4500 Cl	mg/L		0.5-1.5	0.62
15	Lead (Pb)	APHA-3500 Pb B	mg/L	0.01	<0.05	N.D.
16	Fluoride	APHA-4500F- C	mg/L	1.5	<1.5	0.58
17	Aluminum	APHA-3500 Al	mg/L	< 0.2	<0.2	N.D.
18	Manganese (Mn)	APHA-3500 Mn B	mg/L	0.5	<0.5	N.D.
19	Cadmium (Cd)	APHA-3500 Cd B	mg/L	0.003	0.01	N.D.
20	Barium (Ba)	APHA-3500 Ba B	mg/L	0.7	0.7	0.28
21	Mercury (Hg)	APHA-3500 Hg B	mg/L	0.001	<0.001	N.D.
22	Copper (Cu)	APHA- 3500 Cu B	mg/L	2	2	0.05
23	Zinc (Zn)	APHA- 3500 Zn B	mg/L	3	5	0.09
24	Boron (B)	APHA 4500 B- C	mg/L	0.3	0.3	N.D.
25	Chromium (Cr)	APHA 3500 cr B	mg/L	0.05	<0.05	N.D.
26	Selenium (Se)	APHA- 3500 Se C	mg/L	0.01	0.01	N.D.
27	Cyanide (CN)	APHA 4500 CN	mg/L	0.07	<0.05	N.D.
28	E Coli	APHA 9222 D	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0
29	Total Coliform	APHA 9222 B	Number/100 mL	Must not be detectable in any 100 ml sample	0 Number/100 mL	0

NSWQS: National Drinking Water Quality Standards, WHO: World Health Organization
N.D: Not Detected

Signature of Analyst

Signature of Chief Officer

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000391053 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA)-KPK Certified

Surface Water Monitoring Results (Fourth Quarter, 2023)

Integrated Environment Laboratory

SURFACE WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Dam Site (Paras Valley)
Sampling Date:	13-12-2023	Reporting Date:	19-12-2023
Source: GPS Coordinates:	Mushkar River: 34.690247° 73.401992	Analysis Method:	APHA/USEPA Standard Methods

Sr. No	Parameters	Analysis Method	Units	NEQS	Results
1)	Temperature	----	°C	40	8
2)	pH	APHA-4500H-B	-	6-9	7.9
3)	Chemical Oxygen Demand (COD)	APHA-5220-D	mg/l	150	48
4)	Biological Oxygen Demand (BOD5) at 20 °C	APHA, 5210	mg/l	80	33.2
5)	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	1258
6)	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	47
7)	Total Hardness	APHA-2340 C	mg/l	---	183
8)	Oil & Grease	Separation Method	mg/l	10	3.4
9)	Chromium (Hexa & Trivalent)	APHA-3500Cr-B	mg/l	1.0	0.24
10)	Total Iron	APHA-3500-Fe-B	mg/l	8.0	2.9
11)	Chloride	APHA-4500Cl- B	mg/l	1000	256
12)	Fluoride	APHA-4500F- C	mg/l	10	2.89
13)	Ammonia	ASTM-D1426-15	mg/l	40	0.07
14)	Cadmium	APHA-3500 Cd-B	mg/l	0.1	N.D
15)	Lead	APHA-3500-Pb B	mg/l	0.5	N.D
16)	Arsenic	APHA-3500As B	mg/l	1.0	N.D
17)	Copper	APHA-3500Cu B	mg/l	1.0	0.19
18)	Barium	APHA-3500Ba B	mg/l	1.5	N.D
19)	Selenium	APHA- 3500 Se C	mg/l	0.5	N.D
20)	Silver	APHA-3500Ag B	mg/l	1.0	N.D
21)	Manganese	APHA 3500-Mn B	mg/l	1.5	0.15
22)	Zinc	APHA-3500-Zn B	mg/l	5.0	0.39
23)	Nickel	ASTM D1687-95	mg/l	1.0	0.09
24)	Boron	APHA-4500B C	mg/l	6.0	N.D
25)	Mercury	APHA-3500-Hg B	mg/l	0.01	N.D
26)	Sulphide (S^{-2})	APHA-4500 S_2	mg/l	1.0	0.26
27)	Sulphate (SO_4)	APHA-4500-SO_4 D	mg/l	600	211
28)	Anionic Detergent (as MBAS)	---	mg/l	20	0.73
29)	Phenolic Compound (as Phenol)	APHA-5530 D	mg/l	0.1	0.01
30)	Cyanide (as CN) total	APHA 4500-CN	mg/l	1.0	N.D
31)	E-Coli	APHA 9222 D	Number/100 ml	---	Uncountable
32)	Total Coliform	APHA 9222 B	Number/100 ml	---	Uncountable

NEQS: National Environmental Quality Standards for Liquid Effluents N.D: Not Detected

Signature of Analyst

Signature of Lab In-charge

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5701323 Cell: +92 300 0910951 E-mail: [illegible] www. [illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SURFACE WATER ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Tehsil Ujjeenagh (Balkot)
Sampling Date:	12-12-2023	Reporting Date:	18-12-2023
Source: GPS Coordinates:	Kunhar River 34.557124°, 73.3.506141°	Analysis Method	APHA/USEPA Standard Methods

Sr. No	Parameters	Analysis Method	Units	NEQS	Results
1)	Temperature	----	°C	40	8
2)	pH	APHA-4500H+ B	-	6-9	8.2
3)	Chemical Oxygen Demand (COD)	APHA-5220 D	mg/l	150	38
4)	Biological Oxygen Demand (BOD5) at 20 °C	APHA, 5210	mg/l	80	41.3
5)	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	1890
6)	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	114
7)	Total Hardness	APHA-2340 C	mg/l	--	208
8)	Oil & Grease	Gravimetric Method	mg/l	10	1.24
9)	Chromium (Hexa & Trivalent)	APHA-3500Cr B	mg/l	1.0	0.35
10)	Total Iron	APHA-3500-Fe B	mg/l	8.0	3.05
11)	Chloride	APHA-4500Cl- B	mg/l	1000	207
12)	Fluoride	APHA-4500F- C	mg/l	10	2.05
13)	Ammonia	ASTM-D1426-15	mg/l	40	3.41
14)	Cadmium	APHA-3500-Cd B	mg/l	0.1	N.D
15)	Lead	APHA-3500-Pb B	mg/l	0.5	N.D
16)	Arsenic	APHA-3500As B	mg/l	1.0	N.D
17)	Copper	APHA-3500Cu B	mg/l	1.0	0.03
18)	Barium	APHA-3500Ba B	mg/l	1.5	0.09
19)	Selenium	APHA- 3500 Se C	mg/l	0.5	N.D
20)	Silver	APHA-3500Ag B	mg/l	1.0	N.D
21)	Manganese	APHA-3500 Mn B	mg/l	1.5	0.31
22)	Zinc	APHA-3500 Zn B	mg/l	5.0	0.42
23)	Nickel	ASTM D 3841-16	mg/l	1.0	0.08
24)	Boron	APHA-4500B-C	mg/l	6.0	N.D
25)	Mercury	APHA 3500 Hg B	mg/l	0.01	N.D
26)	Sulphide (S^{-2})	APHA-4500 S-	mg/l	1.0	0.07
27)	Sulphate (SO_4)	APHA-4500 SO_4 C	mg/l	600	330
28)	An Ionic Detergent (as MBAS)	----	mg/l	20	1.04
29)	Phenolic Compound (as Phenol)	APHA-5530 D	mg/l	0.1	0.03
30)	Cyanide (as CN) total	APHA-4500-CN	mg/l	1.0	N.D
31)	E-Coli	APHA 9222 D	Number/100 mL	--	Unsatisfactory
32)	Total Coliform	APHA-9222 B	Number/100 ml	--	Unsatisfactory

NEQS: National Environmental Quality Standards for Liquid Effluents M.S. Not Detected

Chemist / Analyst

Director / Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbhar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000391053 Email: [illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SURFACE WATER ANALYSIS REPORT

Reference Number	[illegible]	Client Name	[illegible]
Project Name	Balakot Hydropower Project (300 MW)	Sampling Location	Colony Area (Sanghar)
Sampling Date	13-12-2023	Reporting Date	19-12-2023
Source GPS Coordinates	Kunhar River 34.985033, 73.353668	Analysis Method	APHA/USEPA/ Standard Methods

Sr. No	Parameters	Analysis Method	Units	NEQS	Results
1)	Temperature	---	°C	40	8
2)	pH	APHA-4500H+ B	-	6-9	8.0
3)	Chemical Oxygen Demand (COD)	APHA-5220-D	mg/l	150	79
4)	Biological Oxygen Demand (BOD) at 20 °C	APHA- 5210	mg/l	80	50.4
5)	Total Dissolved Solids (TDS)	APHA-2540 C	mg/l	3500	1947
6)	Total Suspended Solids (TSS)	APHA-2540 D	mg/l	200	193.9
7)	Total Hardness	APHA-2340 C	mg/l	---	338
8)	Oil & Grease	Separation Method	mg/l	10	0.49
9)	Chromium (Hexa & Trivalent)	APHA-3500Cr B	mg/l	1.0	0.17
10)	Total Iron	APHA-3500-Fe B	mg/l	8.0	2.53
11)	Chloride	APHA-4500Cl- B	mg/l	1000	246
12)	Fluoride	APHA-4500F- C	mg/l	10	1.89
13)	Ammonia	ASTM-D1426-15	mg/l	40	0.1
14)	Cadmium	APHA-3500 Cd B	mg/l	0.1	N.D
15)	Lead	APHA-3500 Pb B	mg/l	0.5	0.007
16)	Arsenic	APHA-3500As B	mg/l	1.0	N.D
17)	Copper	APHA-3500Cu B	mg/l	1.0	N.D
18)	Barium	APHA-3500Ba B	mg/l	1.5	0.0346
19)	Selenium	APHA- 3500 Se C	mg/l	0.5	N.D
20)	Silver	APHA-3500Ag B	mg/l	1.0	N.D
21)	Manganese	APHA-3500-Mn B	mg/l	1.5	0.14
22)	Zinc	APHA- 3500-Zn B	mg/l	5.0	0.55
23)	Nickel	ASTM D1687-12	mg/l	1.0	0.004
24)	Boron	APHA-4500B-C	mg/l	6.0	N.D
25)	Mercury	APHA-3500 Hg-B	mg/l	0.01	N.D
26)	Sulphide (S^{-2})	APHA-4500 S-	mg/l	1.0	0.3
27)	Sulphate (SO_4)	APHA-4500-SO_4 C	mg/l	600	338
28)	An Ionic Detergent (as MBAS)	---	mg/l	20	0.04
29)	Phenolic Compound (as Phenol)	APHA-5530-D	mg/l	0.1	0.012
30)	Cyanide (as CN) Total	APHA-4500-CN	mg/l	1.0	N.D
31)	E-Coli	APHA-9222 G	Number/100 ml	---	Unsuitable
32)	Total Coliform	APHA-9222 B	Number/100 ml	---	Unsuitable

NEQS: National Environmental Quality Standards for Liquid Effluents N.D: Not Detected

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Afshaan Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3000391052 Email: [illegible] www.iec-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Soil Analysis Results (Fourth Quarter, 2023)

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (2018/M)	Sampling Location:	[illegible]
Monitoring Date:	13.12.2023	Reporting Date:	[illegible]
Source:	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	[illegible]
		Silt%	[illegible]
		Clay %	[illegible]
		Texture Class	Silty Clay Loam
2	pH		8.4
3	Electrical Conductivity (EC -µSm^{-1})		[illegible]
4	Phosphorus (mgkg^{-1})		1.04
5	Sodium Absorption Ratio		3.03

µSm^{-1}: Micro siemens/meter

mgkg^{-1}: milligram per Kilogram

[illegible]
Signature of Analyst

[illegible]
Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5302323 Cell: +92 3000 8910353 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA #NO Certified)

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-2 (Branch)
Monitoring Date:	13.12.2023	Reporting Date:	15.12.2023
Source:	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	29
		Silt%	40
		Clay %	31
		Texture Class	Silty Clay Loam
2	pH		8.1
3	Electrical Conductivity EC (µS/m^{-1})		239
4	Phosphorus (mg/kg^{-1})		3.47
5	Sodium Absorption Ratio		3.19

µS/m^{-1}: micro siemens/meter
mg/kg^{-1}: milligram per Kilogram

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akbhaar Colony Warsak Road, Peshawar, Pakistan
Tel: +92 91 5252323 Cell: +92 3000891003 Email: iecconsultants@yahoo.com www.iec-consultants.com
Environmental Protection Agency (EPA-EPA) Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Adit-3 (Khalam)
Monitoring Date:	13.12.2023	Reporting Date:	19.12.2023
Source:	Soil Sample		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	22
		Silt%	51
		Clay %	27
		Texture Class	Silty Clay Loam
2	pH		8.4
3	Electrical Conductivity EC (μSm^{-1})		259
4	Phosphorus (mgkg^{-1})		2.33
5	Sodium Absorption Ratio		2.24

μSm^{-1}: micro siemens/meter

mgkg^{-1}: milligram per Kilogram

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Abshaar Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5302323 Cell: +92 3003891053 Email: [illegible] www.iec-consultants.com

Environmental Protection Agency EPA-4/NE Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	Powerhouse (Balkot)
Monitoring Date:	11.12.2023	Reporting Date:	19.12.2023
Source:	Soil Samples		

Sr. No.	Parameters		Results
1	Soil Texture	Sand %	24
		Silt%	38
		Clay %	43
		Texture Class	Silty Clay Loam
2	pH		8.3
3	Electrical Conductivity EC (μSm^{-1})		286
4	Phosphorus (mgkg^{-1})		2.6
5	Sodium Absorption Ratio		4.09

μSm^{-1}: micro siemens/meter
mgkg^{-1}: milligram per Kilogram

Chemist / Analyst

Incharge of Soil Testing

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 05, Main Canal Road, Khushal Colony Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202323 Cell: +92 3005991063 Email: [illegible] www. [illegible]

Environmental Protection Agency (EPA-KPK) Certified

Integrated Environment Laboratory

SOIL ANALYSIS REPORT

Reference Number:	[illegible]	Client Name:	[illegible]
Project Name:	Balakot Hydropower Project (300 MW)	Sampling Location:	GRE Camp Office (Sangher)
Monitoring Year:	[illegible]	Reporting Date:	[illegible]
Source:	Soil Sample		

Sr. No.	Parameters		Results
i	Soil Texture	Sand %	19
		Silt%	57
		Clay %	24
		Texture Class	Silty Clay Loam
ii	pH		8
iii	Electrical Conductivity EC (µSm^{-1})		344
iv	Phosphorus (mgkg^{-1})		3.79
v	Sodium Absorption Ratio		3.69

µSm^{-1}: Micro siemens/meter

mgkg^{-1}: milligram per Kilogram

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

Street No. 09, Main Canal Road, Akshaar Colony, Warsak Road, Peshawar, Pakistan

Tel: +92 91 5202319 Cell: +92 3000991953 Email: [illegible] www.iel-consultants.com

Environmental Protection Agency (EPA-KPK) Certified

Annexure-05: Solid Waste Disposal NOC from KDA

Copy of Solid Waste Disposal NOC from KDA

GOVT. OF KHYBER PAKHTUNKHWA
KAGHAN DEVELOPMENT AUTHORITY (KDA)
MANSEHRA

No. 2503 KDA/Acknowledgement Dated: 1st July 2023

ACKNOWLEDGEMENT

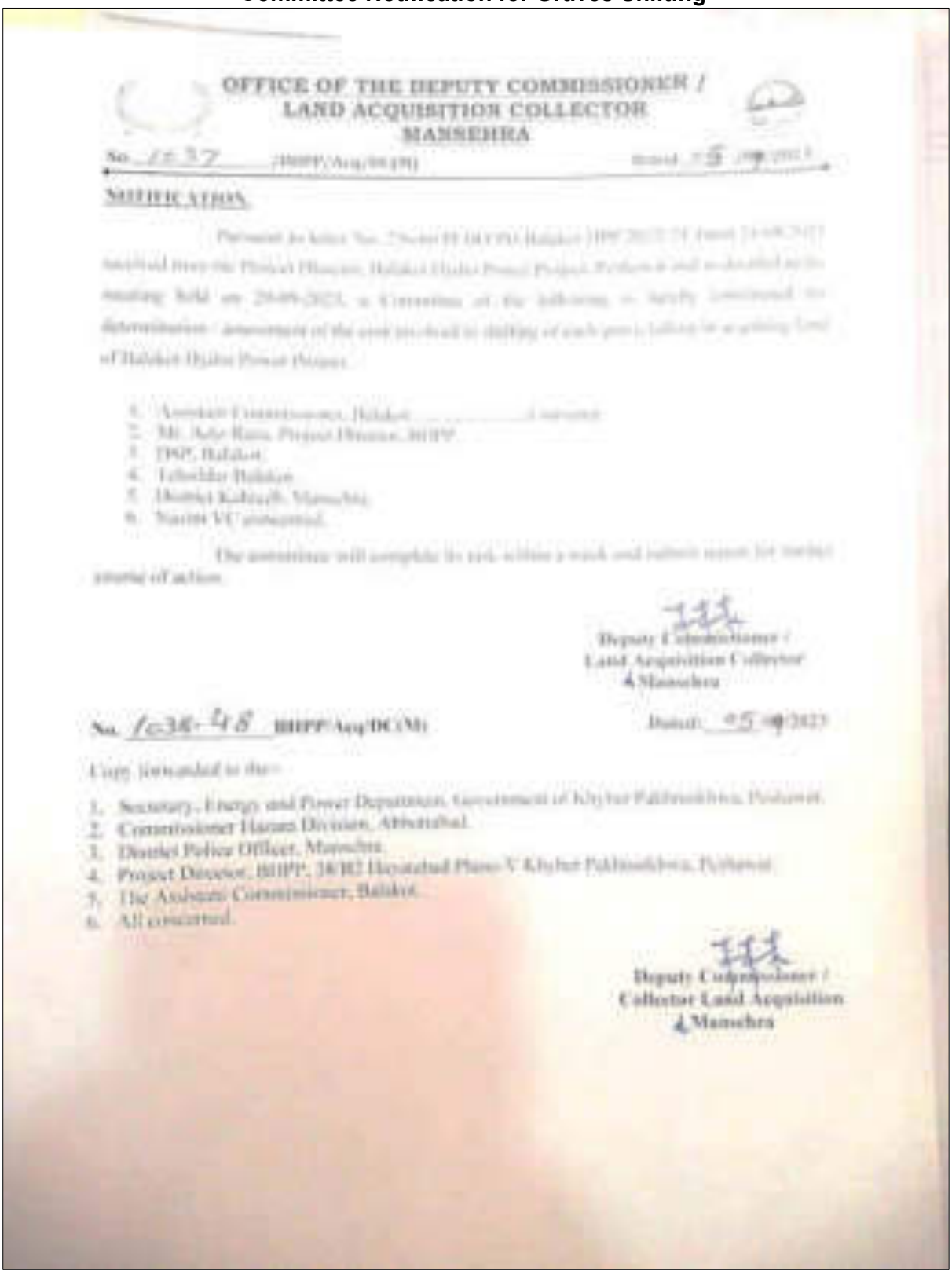
It is acknowledged that OGDC camp II at Ghanool, tehsil Balakot, District Mansehra, containing 33+ rooms, has entered into an agreement with Kaghan Development Authority Mansehra for collection & disposal of kitchen waste / house hold from the camp site to KDA's dumping ground at Malkandi for a period of 1 year starting from 1st July 2023.

DEPUTY DIRECTOR (ADMIN)
KAGHAN DEVELOPMENT AUTHORITY
MANSEHRA

Distribution:
1. [illegible]
2. Office Record

Annexure-06: Committee Notification for Graves Shifting

Committee Notification for Graves Shifting



OFFICE OF THE DEPUTY COMMISSIONER /
LAND ACQUISITION COLLECTOR
MANSEHRA

No. /2537 /BHPP/Acq/DC(M) Dated: 15/9/2023

NOTIFICATION

Pursuant to letter No. [illegible] Balakot HPP 2023-24 dated [illegible] received from the Project Director, Balakot Hydro Power Project, Peshawar and scheduled to be meeting held on 29-09-2023, a Committee of the following is hereby constituted for determination / assessment of the cost involved in shifting of each grave falling in the working land of Balakot Hydro Power Project.

1. Assistant Commissioner, Balakot ... Convener
2. Mr. Ashiq Raza, Project Director, BHPP ... Member
3. DSP, Balakot ... Member
4. Tehsildar Balakot ... Member
5. District Kahzeb, Mansehra ... Member
6. Nazim VC concerned ... Member

The committee will complete its task within a week and submit report for further course of action.

Deputy Commissioner /
Land Acquisition Collector
Mansehra

No. /C-38-48 /BHPP/Acq/DC(M) Dated: 15/9/2023

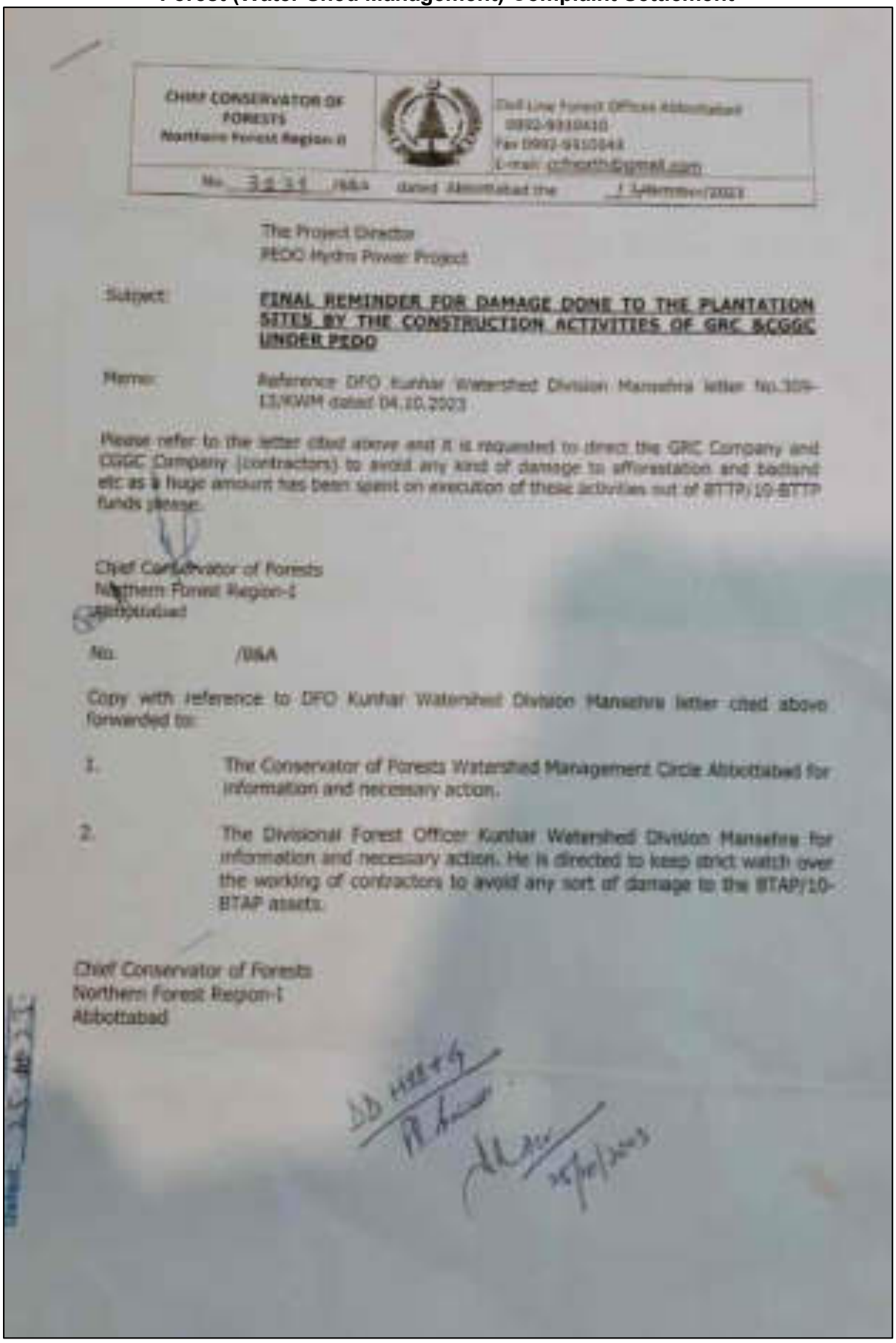
Copy forwarded to the:-

1. Secretary, Energy and Power Department, Government of Khyber Pakhtunkhwa, Peshawar.
2. Commissioner Hazara Division, Abbottabad.
3. District Police Officer, Mansehra.
4. Project Director, BHPP, 38/82 Hayatabad Phase-V Khyber Pakhtunkhwa, Peshawar.
5. The Assistant Commissioner, Balakot.
6. All concerned.

Deputy Commissioner /
Collector Land Acquisition
Mansehra

Annexure-07: Forest Complaint Settlement

Forest (Water Shed Management) Complaint Settlement



CHIEF CONSERVATOR OF FORESTS
Northern Forest Region-I

Civil Line Forest Office Abbottabad
0992-9310410
Fax 0992-9310343
E-mail: cfnorth@gmail.com

No. 3211 /W&A dated Abbottabad the 1 September/2023

The Project Director
PEDO Hydro Power Project

Subject: **FINAL REMINDER FOR DAMAGE DONE TO THE PLANTATION SITES BY THE CONSTRUCTION ACTIVITIES OF GRC &CGGC UNDER PEDO**

Memo: Reference DFO Kunhar Watershed Division Mansehra letter No.309-13/KWM dated 04.10.2003

Please refer to the letter cited above and it is requested to direct the GRC Company and CGGC Company (contractors) to avoid any kind of damage to afforestation and badland etc as a huge amount has been spent on execution of these activities out of BTTP/10-BTTP funds please.

Chief Conservator of Forests
Northern Forest Region-I
Abbottabad

No. /W&A

Copy with reference to DFO Kunhar Watershed Division Mansehra letter cited above forwarded to:

1. The Conservator of Forests Watershed Management Circle Abbottabad for information and necessary action.

2. The Divisional Forest Officer Kunhar Watershed Division Mansehra for information and necessary action. He is directed to keep strict watch over the working of contractors to avoid any sort of damage to the BTAP/10-BTAP assets.

Chief Conservator of Forests
Northern Forest Region-I
Abbottabad