Asian Development Bank	CDCL	Kingdom of Bhutan

Construction Development Corporation Limited (CDCL)
Phuentsholing Township Development Project
Project Number : 50165-002
Loan Number : 3668-BHU(COL)
Grant Number : 0573-BHU(SF)
Contract N° : PTDP-CW-01 &
PTDP-PIC-1

Quarterly Project Report N° 7

Period from 1 April 2020 to 30 June 2020
PIC Report Cataloguing N° PTDP– 063

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History of modifications

Version	Date	Written / Edited by	Reviewed /Approved by
Version 01	28th July 2020	PIC & PIU	
Version 02	30th July 2020	PIC & PIU	PMU

Abbreviations

ADB	: Asian Development Bank
ADF	: Asian Development Fund
ALDTP	: Amochhu Land Development and Township Project
APFS	: Audited Project Financial Statement
BMBMS	: Biodiversity Monitoring and Bench Marking Study
CDCL	: Construction Development Corporation Ltd.
CEMP	: Contractor-Environmental Management Plan
CW	: Civil Works
CV	: Contract Variation
DHI	: Druk Holdings and Investment Ltd.
DMF	: Design Monitoring Framework
EA	: Executing Agency
EIA	: Environmental Impact Assessment
EMP	: Environmental Management Plan
FIDIC	: Fédération des Ingénieurs Conseils
GAP	: Gender Action Plan
GFC	: Good For Construction
GRC	: Grievance Redress Committee
GRM	: Grievance Redress Mechanism
HSE	: Health Safety and Environment
IA	: Implementing Agency
ICB	: International Competitive Bidding
LTP	: Letter to Proceed
MoF	: Ministry of Finance
MOM	: Management, Operation and Maintenance
MoWHS	: Ministry of Works and Human Settlements
NCB	: National Competitive Bidding
NC	: Non-Conformance
NCR	: Non-Conformance Report
NEC	: National Environment Commission
Nu	: Ngultrum
PT	: Phuentsholing Thromde (city council)
PAC	: Project Advisory Committee
PCR	: Phuentsholing – Chamkuna - Road
PIC	: Project Implementation Consultant
PIU	: Project Implementation Unit
PMU	: Project Management Unit
PS	: Provisional sum
PTDP	: Phuentsholing Township Development Project
PPTA	: Project Preparatory Technical Assistance
QAP	: Quality Assurance Plan
RENEW	: Respect Educate Nurture Empower Women
RGoB	: Royal Government of Bhutan
RFI	: Request For Inspection
RFQ	: Request For Quotation
SEMR	: Semi-annual Environmental Monitoring Report
TN	: Technical Note
ToR	: Terms of Reference
VO	: Variation Order

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Project at a Glance

Name of the project	Phuentsholing Township Development Project
Cost of project	63.00 $million
Name of Agency	Druk Holding and Investments Limited
Implementing Agency	Construction Development Corporation Ltd
Approval Date	5th June 2018
Project effectiveness (Loan & Grant)	26th July 2018
CDCL PMU created	26th July 2018
Project Completion Date	30th June 2025 (Overall Zone-A)
Project Closing Date	31st December 2025
Project Location	Bhutan / Phuentsholing
PTDP anticipated impact	Impact 1: Balanced and sustainable development of human settlements ensured; Impact 2: Smart growth principles applied in planning and development.
PTDP anticipated outcome	Phuentsholing's urban area protected from floods and expanded with improved amenities and services
PTDP Outputs	Output 1: Flood and erosion protection measures installed Output 2: Municipal infrastructure constructed Output 3: Township management systems installed
Date of the Loan & Grant agreements	03rd July 2018
Mobilization of PIC	01st October 2018
CW-01 start date	1st November 2018
ADB review missions since project start	14th to 15th Nov 2018, 7th to 10th May 2019, 31st October to 1st November 2019, 16th March to 18th March 2020
Reporting Period	1st January to 31st March 2019

Project funding source	Amount ($million)	Share of Total (%)
Asian Development Bank[a]	53.00	84.1
Ordinary capital resources (concessional loan)	28.74	45.6
Special Funds resources (ADF grant)	24.26	38.5
Government	10.00	15.9
Total	**63.00**	**100.0**

[a] Disaster Risk Reduction Fund will finance $6.07 million equivalent of the concessional OCR loan and $6.07 million of the ADF Grant.

Source: Asian Development Bank.

A. Project activities

A.1 Project Organization Management

General

The proposed Phuentsholing Township Development Project will reclaim total area of 1146.69 acres of riparian land out of which 162.88 acres is under development in zone A. The project will develop river training structure to prevent threat of flooding and erosion, thereby creating additional land for a planned expansion of the Phuentsholing township. The reclaimed areas will be provided with planned services and facilities like access road, water supply, sewerage system, solid waste management, Power, Telecom and early warning system.

Organization

Within the ADB Project agreements, the Executing Agency (EA) of the project is Druk Holding and Investments Limited (DHI). The Implementing Agency (IA) is Construction Development Corporation Limited (CDCL), a subsidiary of DHI specialized in urban and infrastructure development, who has established a Project Management Unit (PMU) at Thimphu and a Project Implementation Unit (PIU) in Phuentsholing for the sole purpose of implementing the Project.

The PIU is headed by a Project Manager and is well staffed. The PIC reports to the Project Manager and supports PIU. The Project management organization chart is displayed hereafter.

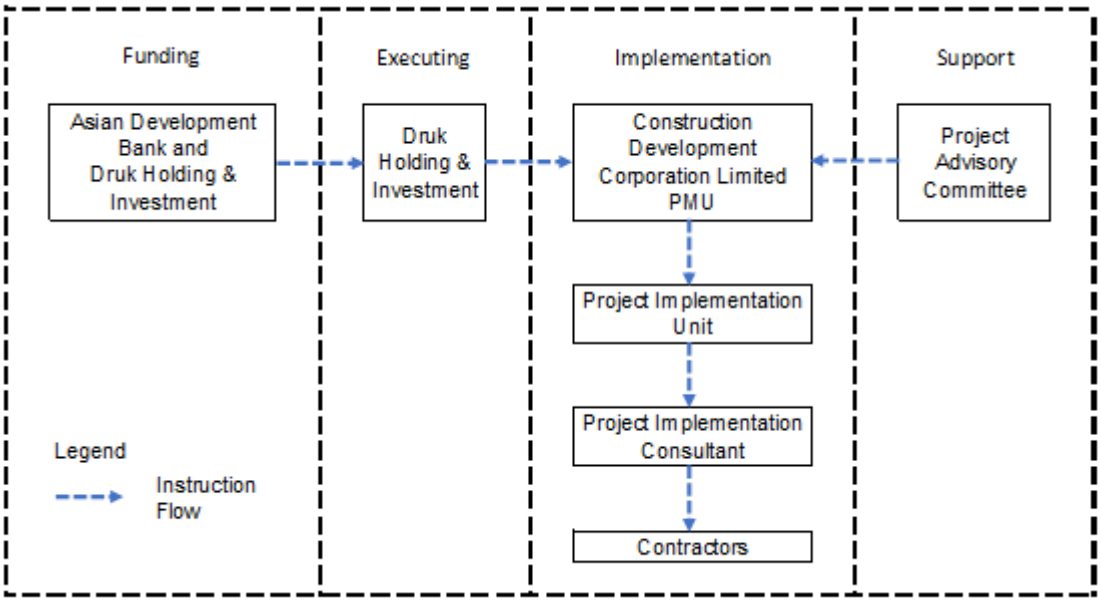


Figure 1: PDTP (Phase 1) Implementation Arrangements

The PMU and PIU staffs are listed in **Appendix 3.**

A.2 Consultant Activities

A.2.1 Signed Consultancy Contracts data / Ongoing Procurement

Consultancy service contract has been signed with M/s. Egis International - Egis India Joint Venture, in association with M/s. Gyaltshen Consultancy as sub-consultant for Project Implementation Consultancy services on 18th July 2018 and were mobilized from 28 October 2018.

Procurement of Independent Environmental Monitoring Expert (IEME), including negotiations, has been conducted by PIU/PMU and the contract signed on April 4, 2019. The input schedule of IEME is attached in Appendix 12. Till date the IEME is mobilized twice in the project to review the project's environmental activities.

A.2.2 Status of Variation Orders

PIC contract Variations:

Contract Variation No.1 has been signed on 7th March 2019

Contract Variation No.2 has been signed on 26th July 2019

A.2.3 PIC Organization and Personnel Activities

Date of present report

Consultant Staffing

Table 1: PIC Staffing bar Schedule

	Position (Experts)	April 2020	May 2020	June 2020
1	Chief Resident Engineer / Team Leader			
2	Senior Civil Engineer / DTL			
3	Material Engineer / Engineering Geologist			
4	Contract Specialist			
5	Environmental Specialist			
6	Financial Management Specialist			
7	Hydrology/Sediment Specialist			
8	Quality Control/ Construction Manager			
9	Material Engineer			
10	Safeguards Specialist			
11	Geotechnical Engineer			
12	Structural Engineer			
13	Roads Engineer			
14	Water Supply / Sewerage. / Hydr. Eng.			
15	Water Treatment Process Specialist			
16	Solid Waste Management Specialist			
17	Electro-Mechanical Engineer			
18	Quantity Surveyor			
19	Environmentalist			
20	National Hydraulic Engineer			
21	International Hydraulic Modelling Specialist			

PIC Logistic

Table 2:PIC logistics

Site Office	Provided by Client as per contract
Office Equipment	Adequate, as per contract
Transportation	Adequate, as per contract

Construction Supervision (CS) Team Activities

1. **Mobilization of Specialists**

Table 3:Mobilization of Specialist

Sl. No.	Particulars	Date	Purpose
1	National Hydraulic Engineer / Mr. Chhimi Dorji (Home Input for 2D Hydraulic Modelling)	08th April 2020	Worked on Editing and formatting of Report Version of April 2020
		09th April 2020	Worked on Editing and formatting of Report Version of April 2021
		10th April 2020	Worked on Editing and formatting of Report Version of April 2022
		16th April 2020	Analysis of Outfalls from PCR/hillside to PTDP
		17th April 2020	Meeting at CDCL & Reviews
		20th April 2020	Review of previous Calculations
		21st April 2020	Preparation of Report on Outfalls for Submission to PIU
		22nd April 2020	Revision of ADB Comments to 2D Report
		27th April 2020	Addressing Comments on Behalf of International Expert
		28th April 2020	Addressing Comments on Behalf of International Expert
		29th April 2020	Updating the Report and Submitting it to Team Leader

2. **PIC Reports**

Table 4:PIC Reports

Sl. No	Reports	Date
1	**Bi-weekly Progress Report 2020**	
A	Bi- Weekly Progress Report (1st April 2020 - 15th April 2020)	22nd April 2020
B	Bi- Weekly Progress Report (1st May 2020 – 15th May 2020)	26th May 2020
C	Bi- Weekly Progress Report (01st June 2020 – 15th June 2020)	27th June 2020
2	**Monthly Project Report 2020**	
A	Project Monthly Report M17 – (April 2019)	26th May 2020
B	Project Monthly Report M18 – (May 2020)	27th June 2020
3	**Quarterly Project Report**	
A	Quarterly Project Report N6 (1st January 2020 – 31st March 2020) Revision 01	20th April 2020
4	**Other Reports 2020**	
A	Project Performance Management Evaluation System Version 03 (Enclosed with QPR – N6)	20th April 2020
B	Risk Management Plan Revision 02 (Enclosed with QPR – N6)	20th April 2020

3. Official Meeting /Site Visit

- CEO & Director, Druk Holdings & Investments & Acting CEO, CDCL Meeting & Site Visit on 20th April 2020
- Royal Bhutan Army, Royal Bhutan Police & other officials Meeting with PIU on 25th April 2020
- Analyst, DHI & PD, PMU (CDCL) on 28th May 2020 – 1st April 2020
- Bhutan Power Corporation Limited & Bhutan Telecom Meeting & Site Visit on 05th May 2020
- Architect, CDCL present at project site from 26th June 2020 – 02nd July 2020

4. Special Meeting / Discussion

- Presentation of CW-02 Package to Project Level Board, CDCL – 8th May 2020
- Presentation of CW-02 Package to CDCL Management- 17th June 2020
- Presentation of CW-02 Package to DHI – 18th June 2020
- ADB virtual Fact Finding Mission for additional Financing – June 2020
- Presentation & Discussion on CW-02 package between PIU & PIC – 22nd June 2020

5. Health Safety & Environment

- Thermal fogging was done at Office and camp area by Phuentsholing General Hospital on 8th April 2020
- Basic Awareness Message on Prevention and Control of Dengue by Mr. Kinley Penjor from Vector Borne Disease Control Programme 09th April 2020
- ECOLAB & PTDP HSE Team Meeting regarding Air Monitoring Device on 21st April 2020
- Inauguration Ceremony of Emergency Housing Settlement on 15th May 2020
- Changing of Air Monitoring Device Filter on 23rd May 2020
- Training by CW01 on Emergency Flood Evacuation, COVID-19 and Rigging & Lifting Safety conducted on 28th May 2020
- Social Forestry Day (Mass Cleaning at Project Site and Tree Plantation at PIU Camp) on 02nd June 2020
- Health Awareness Session by Phuntsholing General Hospital on COVID-19, Feminine Hygiene, Dengue/Malaria & HIV/AIDS conducted on 27th June 2020

Table 5:Activities under Health safety and Environment

Sl. No	Activities	Date
1	Terrestrial Survey at Zone A & B	16th April 2020
2	Surface Water Sampling for SW04 & SW05	21st April 2020
3	Terrestrial Survey at Zone A & B	16th May 2020
4	Surface Water (SW-04 & SW05) & Ground Water Quality Testing at Zone A	20th May 2020
5	Terrestrial Survey at Zone A & B	17th June 2020
6	Surface Water Testing SW04, SW05 at 10:30 AM	20th June 2020

6. Coordination Meeting (PIU, PIC, CW01)

- Coordination Meeting – 05 (PMU/PIU, PIC CW01) dated 30th April 2020

7. Production of PIC Technical Note in this Report Period

- (TN n° 19) Raising of Diaphragm Wall Top Level at Omchhu River
- (TN n° 20) Irrigation System Work at CW01 Package
- (TN n° 21) Review of New Outfall Dimension for PCR and its relation to PTDP

8. Update on Site Condition due to COVID-19

- Bhutan Government announced regarding the Closing of International Border Gate w.e.f. Monday, 23rd March 2020 until further notice due to COVID-19 Pandemic.

- Indian Government announced 21 days of complete lockdown for India w.e.f. 25th March 2020 midnight. Therefore, PIC is looking into what extent PTDP will be affected due to this situation for further discussion with the team.

Following are the notice from Ministry of Home and Cultural Affairs (Bhutan):

1. In order to enter from the international border, everyone shall be subject to medical screening & mandatory three-week quarantine at a designated facility

2. Foreigners will be allowed to exit; but entry is restricted unless strong justification is provided.

The Indian Government announced 4 nationwide lock down. Timelines are as follows:

1. First 21 Days from 25th March 2020 – 14th April 2020
2. Extension from 15th April 2020 – 03rd May 2020
3. Additional Extension from 04th May 2020 – 17th May 2020
4. Further Extension from 18th May 2020 – 31st May 2020

PIC to look into what extent the PTDP will be affected due to this situation in terms of the work progress. Thus, this situation has impacted CW01 in terms of the following:

1. Man Power

- Most of the CW01 workers (nearly 200 manpower) who were on leave since 16th March 2020 are still unable to return back to work due to the International Border seal from Govt. of Bhutan and Lockdown in India.
- CW01 has requested PMU/PIU for their support in recruiting manpower from green zone area from India. PMU/PIU will discuss this matter with the COVID-19 task force
- CW01 had also submitted their list of required manpower to MoLHR and will recruit 100 national workers for various categories as soon as possible for smooth functioning of the project

2. Materials / Equipments & Spare Parts

- As per discussion between PIC & CW01, the work progress of the project is still under control. Major materials for works are available in stock for 3 months currently (Up to July 2020)
- Other major materials such as Bentonite, Admixtures & Steel are delivered to site as well.
- Major equipment / spare parts for Diaphragm wall rigs & equipments availability of spare parts are becoming a difficult task due to lockdown and repairing of equipments/spare parts takes a lot of days.

Use of Provisional Sum

Table 6:Status of use of PIC contract provisional sum

Item	Status	Amount (USD)
Studies, Surveys and Reports	a) Biodiversity Monitoring and Benchmarking Survey. • PIC is waiting for PMU / PIU decision on rescheduling of BMBMS study. b) Flood Management Consultancy. • Processing endorsement of Flood Management Expert's CV to initiate FMC. • The proposal and CV is submitted to ADB for endorsement	230 000
Topographic and Bathymetric Surveys for 2D Modeling	Complete of work, as per the contract	35 000
2D Modeling Software License Rental for 2 months	Complete of work, as per the contract	1 750

2D Modeling

- PIC submitted 2D hydraulic Modeling draft report, revision 01 on 13th March 2020 for PIUs review and record. 2D modelling work is completed, as per the contract. The same is submitted to ADB for review and comments.

A.2.4 PIC Performance

PIC is mandated to provide technical, management and supervision support to PIU/PMU in implementation of the project. Thus far, PIC has been professional and consistent in furnishing with the required deliverables as agreed in contract documents. PIC has also provided technical advice and support to client in areas of project interest and ensured proper supervision and monitoring at project site. PIC has also provided technical justifications and value addition to the planned works and have recommended few minor changes in the interest of the project. Hence, the client is currently comfortable with the performance and the competence in PIC.

The mobilization and demobilization of PIC experts are followed as per the planned and agreed schedule within the project period. The mobilization-demobilization schedule will ensure that the number of PIC man-months proposed/agreed for each expert (as per contract) fits in the overall project duration of 60 months.

A.2.5 PIC Man-Months:

Table below shows the summary of PIC experts mobilized till the report period and the remaining man-months available:

PIC Person Month Used / Balance as of June 2020

No.	Name / Position (as in TECH-6)	Nationality / Firm	Currency	CONTRACT PROVISION AFTER CONTRACT VARIATION 2 (Person-month)	Mobilized till June- 2020	BALANCE REMAINING (Person-month)
	#NAME?					
1.	Mehmet Kahraman	Ireland	USD	1,50	0,20	1,30
	Chief Resident Engineer / Team Leader	Egis International		32,50	11,69	20,81
2.	Edwin ANGGRIJATNO	Indonesian	USD	1,00		1,00
	Senior Civil Engineer / Deputy Team Leader	Egis International		39,00	15,80	23,20
3.	Vishwas R RAO	Indian	USD	-		0,00
	Material Engineer/ Engineering Geologist	Egis India		4,00	0,90	3,10
4.	Lucila PERLADA	Filipino	USD	1,00	0,73	0,27
	Contract Specialist	Egis International		3,00	0,83	2,17
5.	Surjit Singh DEEPAK	Indian	USD	-		0,00
	Environmental Specialist	Egis India		3,00	0,53	2,47
6.	Virgilio DIZON	Filipino	USD	1,00		1,00
	Financial Management Specialist	Egis International		5,00	0,87	4,13
7.	John FIELD	American	USD	1,00		1,00
	Hydrology/Sediment Specialist	Egis International		2,50	1,63	0,87
7.a	John FIELD	American	USD	1,00		1,00
	Team Leader / River Engineer / River Morphology Specialist	Egis International		2,50	0,43	2,07
8.	Christiaan Sprengers	Dutch	USD	-		0,00
	Hyraulic Modelling Specialist	Egis International		2,23	2,23	-
	Sub-Total for Key Experts (International)			**100,23**		78,88
	KEY EXPERTS (National)					
9.	Sonam Tobgay K	Bhutanese	BTN	-		0,00
	Quality Control / Construction Manager	Gyaltshen		40,00	19,97	20,03
10.	Dwarika Gotamey	Bhutanese	BTN	-		0,00
	Material Engineer	Gyaltshen		40,00	17,37	22,63
11.	Megay Penjore	Bhutanese	BTN	-		0,00
	Safeguards and Communications Specialist	Gyaltshen		8,00	2,54	5,46
12.	Chimi Dorji	Bhutanese	BTN	-		0,00
	National Hydraulic Engineer	Gyaltshen		2,00	2,00	0,00
12.a	Chimi Dorji	Bhutanese	BTN	-	-	0,00
	Flood Early Warning Specialist/Hydrologist/Hydraulic	Gyaltshen		4,00	-	4,00
13.	Gautam Thapa	Bhutanese	BTN	-		0,00
	Flood Management Specialist	Gyaltshen		4,00		4,00
	NON-KEY EXPERTS (International)					
14.	Bosco PURNOMO	Indonesian	USD	-		0,00
	Geotechnical Engineer	Egis International		3,00		3,00
15.	Prasanta Kumar Bhowmik	Bangladesh	USD	1,00	-	1,00
	Structural Engineer	Egis International		3,00	0,97	2,03
16.	Nirupam Singh	Indian	USD	1,00	-	1,00
	Roads Engineer	Egis India		2,50	-	2,50
17.	Guillaume HOUDRE	French	USD	1,00	0,13	0,87
	Water Supply / Sewerage / Hydraulics Engineer	Egis International		1,00		1,00
18.	Gautier MAIN	French	USD	1,00	0,10	0,90
	Water Treatment Process Specialist	Egis International		1,00		1,00
19.	Christopher ROUND	French	USD	1,00	0,13	0,87
	Solid Waste Management Specialist	Egis International		1,00		1,00
20.	Dominique CHOD	French	USD	1,00	0,20	0,80
	Electro-Mechanical Engineer	Egis International		1,00		1,00
	NON-KEY EXPERTS (National)					
21.	Karma Dezang	Bhutanese	BTN	-		0,00
	Quantity Surveyor	Gyaltshen		40,00	15,33	24,67
22.	Sonam Deki	Bhutanese	BTN	-		0,00
	Environmentalist	Gyaltshen		20,00	6,42	13,58
23.	Yangchen Seldon	Bhutanese	BTN	-		0,00
	Laboratory Technician 1	Gyaltshen		24,00	10,50	13,50
24.	Tashi Namgyel	Bhutanese	BTN	-		0,00
	Site Inspector 3	Gyaltshen		24,00	10,97	13,03
25.	Yeshi Jamtsho	Bhutanese	BTN	-		0,00
	Site Inspector 4	Gyaltshen		24,00	6,83	17,17

A.2.6 Independent Environmental Monitoring Expert:

CDCL signed the contract with Independent Environmental Monitoring Expert on 4th April 2019. The proposed mobilization dates for the Independent environmentalist is attached in **Appendix 12**

A.3 Implementation of physical works

A.3.1 Signed Civil Works Contracts data / Ongoing Procurement

Only one contract is signed with AFCONS Infrastructure Pvt. Ltd for river training works on 18th July 2018. Site handed over on 27th September 2018. Notice to commence from 1st November 2018.

A.3.2 Status of variation orders

No new Variation Order issued for CW-01.
PMU/PIU is currently processing to award the additional work along Omchhu. The variation order is expected to be awarded to CW-01 contractor within third Qtr, 2020, after prior endorsement from ADB. Documents will be sent to ADB in first week of July.

A.3.3 Civil Works package summary of financial progress

Table 7:CW-01 Summary of financial progress

Contract	Contract Date	Start date	Time for completion (days)	Completion date	Financial progress (%)		Elapsed time (days)
					Target	Actual	
CW-01	18 July 2018	01 Nov. 2018	912	01 May 2021	77.4	45.01	607

Material Advance for April 2020

Table 8:CW-01 Contractors Establishment

N°	Description	Status
1	Project Management	At the end of the report period, 38 expatriat staffs, 10 national staffs and 15 Sub-Contractor national staffs. Totally 63 Management Staff available up to this month.
2	Manpower	At the end of the report period, there was 329 manpower available. Contractor: 57 National Manpower and 170 Expatriate Manpower. Sub-Contractors: 63 National Manpower and 39 Expatriate Manpower. The figure includes Management staff, supervisory level staff, watch & ward and main workforce. Due to COVID-19, the workforce numbers have decreased by around 50% as compared to pre-COVID times.
3	Plant and Equipment	All key equipment as per required by Contract Document – General Specifications, Section-7 had been mobilized to the project site.
5	Quarry / Crusher	No Quarry / Crusher is provided by Contractor. *Source of coarse aggregates and fine aggregates are from private Quarry / Crusher supplier located within the vicinity of the project site*.
6	Pre-casting Yard	Pre-casting yard for precast grass paver blocks,tree pit, tree pit cover and drain including curing ponds and stock yard.
7	Filling Material	No Quarry will be provided by Contractor *Source of filling material is from Quarry / Crusher supplier located at project vicinity*

Table 9:CW-01 Physical Work progress

General Requirements

N°	Description	Status
1	Site Possession	Handover of Hindrance Free Area for the project on 27th September 2018. Area handover for Site Installation 1st November 2018
2	Obstructions	Traffics from public / private vehicles moves inside project site at some locations.
3	Utilities [electrical poles etc.]	Frequent failures of electrical power supply at site offices. Tap water supply for site offices is not continuous during the day work. *Contractor to provide suitable generator set to supply electricity temporarily during blackout time.* *Contractor to ensure the continuous supply of tap water by providing a proper pump.*
4	Health &Safety	No NCR / CAR issued. 1 Lost time injury, 1 Man – days lost were reported during the period.
5	Maintenance of Site Road	PTDP Contractor and PCR Contractor carries out dust control by a periodic sprinkling of water on and maintenance of the temporary road.
6	Environment	No NCR / CAR issued. No environmental accidents reported.
7	GRM	No grievances related to Contractors activities registered during the last 3 months.
8	Design	The contractor is required to review all the latest revision working drawing (good for construction) and submit a discrepancy list (if any). GFC drawing for outfalls need to be redesign and release to contractor except for outfall 2, outfall 2a and open outfall 8. Currently the employer design consultant is processing the redesign of outfall since PCR has confirmed regarding the change dimension data and entry invert level data of box culverts. GFC drawing for hill slope stability work needs to be redesigned refer to actual site condition and RCC retaining wall structure needs to be changed into gabion wall structure.

Quality Control Activities

N°	Description	Status
1	Contractor Quality Control Plan	Quality Control Plan has been submitted to PIC by contractor. Quality Control Plan is very broadly and refers to an internal set of procedures from Contractors, submitted on case-by-case basis. PIC checks when required and sometimes may request for improvement, dependin on its requirement. PIC, in particular, requires the Contractor to revise QCP as follows: *Method Statement for all work activities with shop drawings are submitted and approved prior to the commencement of work.* *Test are conducted for all materials to be used for construction as per the technical specifications and as per the instruction of the engineer's representative.* *Testing frequency is followed as per the technical specification and standard* *QCP are submitted for all work activities.*
2	Material Source Approval & mix designs	Materials source have been approved: - *Source approval of hand rail sample* - *Source Approval of Hot dip galvanized cow chain from SAICORIAN Infrastructure Pvt.Ltd*
3	Materials Testing	Regular Tests: Cement Testing: Cement cube compressive strength test, Normal consistency, Initial & Final Setting Time, Fineness Test. Concrete cube compressive strength test (7d and 28d) Aggregate for concrete: Gradation test, Impact, shape test, water absorbtion, Flakiness, elongation index, Impact value of coarse aggregate Gradation test, water absorbtion, Fineness Modulus for Fine Aggregate Earth Filling Material: Atterberg Limits, MDD & OMC Mix Design: If source like cement, aggregate, sand and admixture gets change mix design is carried out as required
4	Non-Conformance	No NCR was issued during this reporting period

Works Status

N°	Description	Status
1	General Items	Site offices, Contractor's Staff and Labour accommodation, Materials Stock Yards, Testing Laboratory and Batching Plant with Silos have all been established. CW01 is responsible of Operation and Maintenance for all facilities
2a	River Training Works	Guide Wall work: 4667 m cumulative length completed Diaphragm Wall: 4110 m cumulative length completed Cast In-situ Wall: 6681 cum cumulative completed
2b	Embankment Works	The upper walkway level: 5.920 m and the embankment level: 6.040 m above the proposed river bed level have been finalized resulted from the 2D Hydraulic Modelling Report. Outfall 2- 60% completed (as per initial design level). Outfall 3- 18% completed (as per initial design level). Some modification/alteration is required to adjust the completed outfall works to the revised design level. Embankment Filling Item 301 – completed 20829 cum Embankment Filling Item 302 – completed 14548 cum Total quantity of embankment filling – completed 35377 cum
2c	General Earth Filling	Started on 18 Feb. 2019. Earthworks are executed by Sub-Contractor, M/s Rigsar Construction Company Pvt. Ltd. General Earth Filling Item No. 401 – completed 589,157.53 cum General Earth Filling Item No. 402 – completed 662029 cum Total quantity of general earth filling – completed 1251186.53 cum
2d	Promenade Finishing	Production of Precast Grass Paver Blocks (Hollow) – completed 7459 Nos. Production of Precast Cement Concrete Blocks (Solid) – completed 1425 Nos. Production of Tree pit – completed 357 Nos. during this reporting period Production of Tree pit cover – Completed 114 Nos. during this reporting period Production of precast channel – completed 228 Nos. during this reporting period Total quantity – completed 9583 Nos.
2e	Irrigation & Landscape	Irrigation Work cancelled by the Employer Landscape work not yet started
3	Provisional Sum	For Survey Equipment, Office Camera, Projector and Radio Handset. *Procurement conducted and equipment received.*
		For pickup vehicles. *Procurement cancelled by the employer. Vehicle procured from employer's fund.*
		For electricity main supply: partially used for installing the main transformer for the project
		For Geological Investigations. *Partially used for investigations of rock / boulders layer at North end part-08*
		For Temporary Flood Protection *Partially used for strengthening existing long spur and existing big bund and to construct new spurs*
4	Day works	No day works ordered
5	Extra Item	No extra item

Table 10:Financial Progress per Major Works Items

Sl. No.	Description	Amount (Nu. in million)	Jan/19	Feb/19	Mar/19	Apr/19	May/19	Jun/19	Jul/19	Aug/19	Sep/19	Oct/19	Nov/19	Dec/19	Jan/20	Feb/20	Mar/20	Apr/20	May/20	Jun/20	Planned	Achieved	Target %	Achieved %
PTDP Contract Package CW-01			68,71	154,76	250,02	342,21	453,78	569,87	685,19	807,52	934,34	1056,65	1155,11	1312,79	1492,52	1673,40	1842,11	1999,12	2097,19	2169,16	2169,16	1033,87		
a	River Training Works	1.090,26	49,68	49,68	55,01	53,23	72,16	77,13	75,07	81,98	82,91	79,76	65,39	85,68	72,94	80,15	64,76	44,74	0,00	0,00	1090,26	845,18	100%	78%
	Diaphragm Wall	830,42	49,7	49,7	55,0	53,2	55,0	53,2	55,0	55,0	53,2	55,0	53,2	55,0	55,0	51,5	55,0	26,6			830,4	710,2	100%	86%
	Cast In-situ Wall	100,52					8,5	9,8	9,8	9,5	9,8	10,2	8,2	10,2	4,3	9,5	3,6	7,2			100,5	118,0	100%	117%
	Anchor Slab	79,79					6,8	8,5	8,7	8,7	8,5	2,8	1,7	8,7	8,7	8,2	2,0	6,5			79,8	2,1	100%	3%
	Deadman Anchor	41,54					1,9	5,6	1,5	4,3	5,6	5,8	1,1	5,8	2,4	5,4	2,1				41,5	14,9	100%	36%
	Anchor Bar	37,99								4,4	5,8	6,0	1,2	6,0	2,5	5,6	2,1	4,4			38,0		100%	0%
b	Embankment	694,13	6,34	12,69	14,05	13,59	14,05	13,59	14,05	14,14	18,54	14,91	5,43	34,91	65,28	70,38	75,23	73,37	74,80	55,25	590,60	33,86	85%	5%
	Embankment Filling	30,12								0,1	2,8	2,9	2,8	2,9	2,9	2,7	2,9	2,8	2,9	2,8	28,3	6,9	94%	23%
	Stone Wire Crates	106,64									10,3	12,0			8,6	12,5	13,3	12,9	9,5	4,7	83,8	0,0	79%	0%
	Retaining Wall	199,41													21,8	25,3	27,0	26,1	27,0	26,1	153,3	5,2	77%	3%
	Ducted Outfall	190,31	6,3	12,7	14,0	13,6	14,0	13,6	14,0	14,0	5,4		0,5	14,0	14,0	13,1	14,0	13,6	13,1		190,3	4,3	100%	2%
	Open Outfall	133,25											0,5	16,2	16,2	15,2	16,2	15,7	16,2	15,7	111,8	17,4	84%	13%
	Access & Ghats	21,10											1,7	1,8	1,8	1,7	1,8	1,7	1,8	1,7	14,0	0,0	66%	0%
	Hill Slope Stability	13,30																0,6	4,3	4,2	9,1	0,0	68%	0%
c	General Earth Filling	429,53	12,68	23,67	26,21	25,37	25,37	25,37	26,21	26,21	25,37	26,21	25,37	26,21	26,21	14,37	12,68	26,21	9,30	0,00	383,02	130,48	89%	30%
	General Earth Filling	429,53	12,7	23,7	26,2	25,4	25,4	25,4	26,2	26,2	25,4	26,2	25,4	26,2	26,2	14,4	12,7	26,2	9,3		383,0	130,5	89%	30%
d	Promenade Finishing	149,72	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,44	2,27	7,81	11,76	11,01	11,76	10,78	11,76	11,38	79,97	24,35	53%	16%
	Lower Walkway	33,62										1,4	2,3	2,3	2,3	2,2	2,3	2,3	2,3	2,3	19,8	0,1	59%	0%
	Upper Walkway	116,11												5,5	9,4	8,8	9,4	8,5	9,4	9,1	60,2	24,3	52%	21%
e	Irrigation & Landscape Works	70,66	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3,08	3,53	4,97	4,26	1,92	2,20	5,34	25,30	0,00	36%	0%
	Irrigation Works	47,74												3,1	3,5	3,3	2,3		0,3	3,4	16,0	0,0	33%	0%
	Landscape Works	22,92														1,7	2,0	1,9	1,9	1,9	9,3	0,0	41%	0%

A.4 Progress Made Until 30 June 2020

Table 11: Cumulative Project Progress until the report period

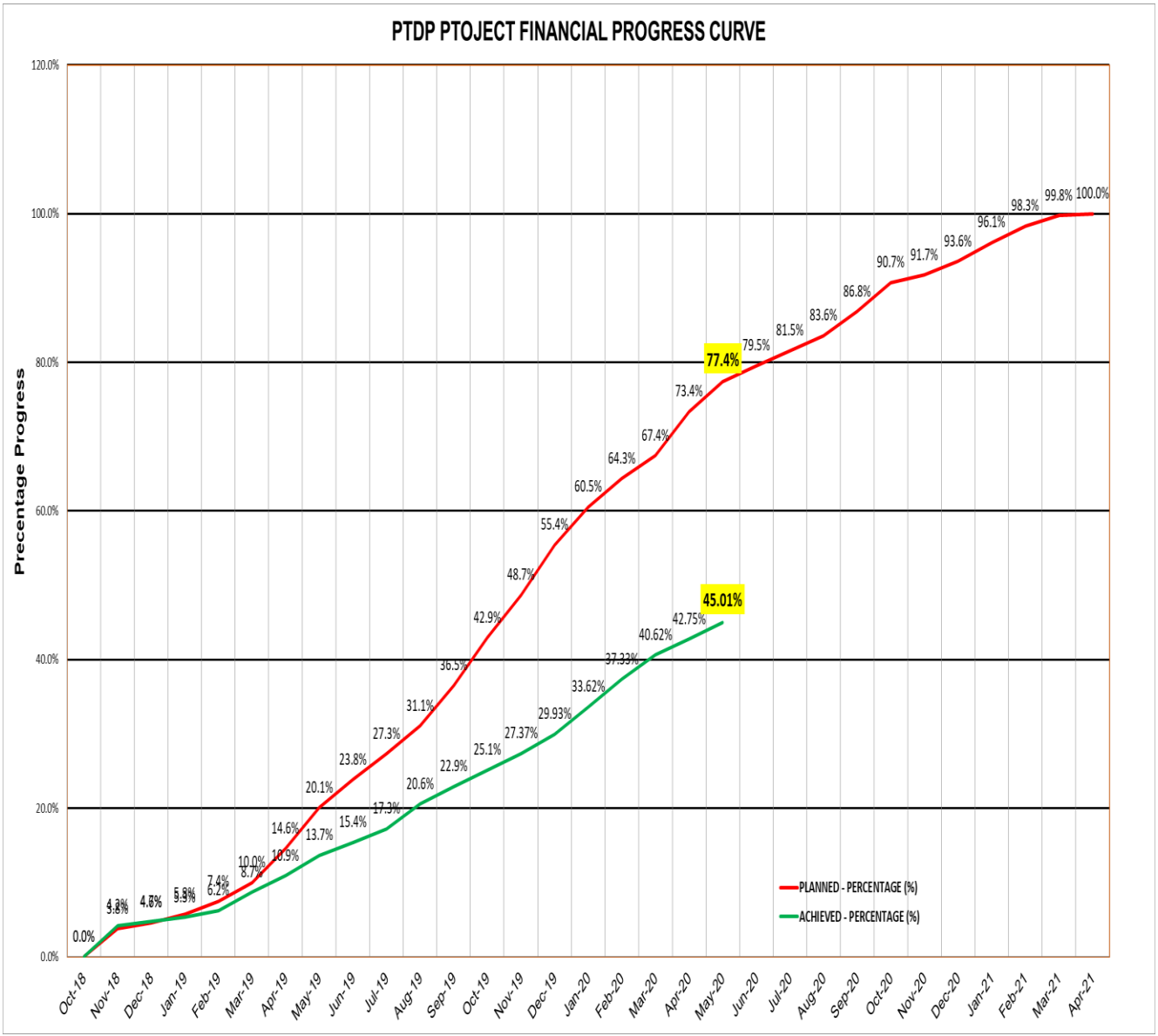
Activity	% Accomplished vs. Target for the period[a]		Summary of Progress
	Accum.*	Planned	
River Training and Embankment Protection Works	45.01%	77.4%	D-Wall: 4110 m length; Cast In Situ Wall : 6681 cum length; General Earth Filling: 1251186.53 cum
Common Urban Infrastructures	0.0%	0.0%	
Township Management System	0.0%	0.0%	

*Accomplishment and target refer to the financial forecast

Progress of activities against output indicators are listed in **Appendix-1**.

The updated implementation schedule showing actual progress included in **Appendix-2**.

Progress photograph is attached in **Appendix-13**



CW01 Financial Disbursement Vs. Baseline Projection

Note: The Value shown in above graph excludes taxes and price adjustment. The data is until May 2020

A.5 Field Monitoring visits, workshops, training and particular meetings

The list of field monitoring visits, workshops, training and particular meetings is presented in **Appendix 4**

B. Key Implementation Challenges and Proposed Actions

B.1 Main issues

The Major issues described here are analyses of the problems encountered during the execution of the project as well as making recommendations for future action to resolve by the project stakeholders through their contractual obligations from the start of the project until 30 June 2020.

COVID-19 pandemic may impact the work progress of PTDP, however Good coordination among all parties, Employer, the Engineer and the contractor is being maintained to keep the project running and to avoid the possibility of force majeure.

Responsibilities of individual parties to manage the issues are enlisted here under:

The Employer (PIU / PMU):

i. To prepare a plan cautiously for the timely completion of the project. The project is currently behind schedule by 32 % upto end of May 2020 with reference to the financial progress of the project.
ii. To confirm works sanctioning for milestones (problems in taking over of part of completed works, several defects liability periods and responsibility of maintenance of post construction). Originally set of milestones have not been applied. New milestones need to be set due to the change of project level. This is discussed under B.1.1 contractual issues below in more detail.
iii. To agree and revise the final layout of the project boundary between PTDP and PCR in relation to the change of road alignment from single carriageway to dual carriageway type and associated junctions, service roads details for a smooth connectivity to PTDP.
iv. To cordinate with the design consultant to release the outstanding revised GFC drawings for outfalls (GFC for ducted outfall 2, ducted outfall 2a and ducted outfall 8 is released to CW-01) for CW-01 to proceed for construction in order to prevent the possible project delay. This will also depend on the PCR culverts final designs.
v. To issue an official instruction to start the additional omchhu river training works from PTDP boundary to Omchu bridge II abutment
vi. To be prepared for the possibility of cost compensation claims by Contractor due to the delay because of embankment level issues and redesign of outfalls, omitted works and the possibility of force majeure
vii. To decide and process regarding design changes of hill slope stability structures. PIC proposes to change the RCC wall structure to gabion wall considering the deletion of lower walkway slab in part-1 & part-2 which is the contractor has procured the wire crate materials and from architectural point of view
viii. To continue working on the package CW-02 bid documentation, finalize the scope, BoQ and the revised drawings of the CW02 for submission to ADB.
ix. To coordinate with the relevant Governmental Authorities in order to control / mitigate the possible negative impact from the temporary settlements / housing within PTDP initiated by the Government to mitigateCOVID-19 situation.

The Engineer (PIC):

i. Mobilization / Demobilization of PIC Key Experts: With the current available manpower at site, contractor is working 24 hours especially on embankment filling works, protection wall works and lower walkway slab works, except during heavy rainfall situation. The D-Wall works continues and the contractor aims to complete the D-Wall works (original scope) by November 2020 The presence of PIC key experts at site is therefore inevitable. The PIC needs to keep and maintain

all the records properly for all of the works, which is important for the future references. The PIC is also assisting the PIU to prepare for the CW02 bidding documents.

ii. Engineer is in opinion that drawings provided in Contract documents cannot be considered as "Good for Constrcution" drawings. A lot of "unclear" information in the revised GFC Drawings are found so that the shop drawings need to be prepared and submitted properly by the contractor for the Engineer to review and approve before the work is executed.

iii. All unclear information from GFC drawing are forwarded to the client for further clarification from the design consultant (HCP).

iv. There are a lot of Information mismatch between GFC drawing, bill of quantities and technical specifications which creates confusion while making proper decisions. During the clarification process some time are lost which may create room for potential claims from the contractor.

v. Construction supervision team's staff to match with Contractor's activity progress. Additional technical staff, i.e., site inspectors may be required as the project progressess. However, due to COVID-19 situation the work progress has currently slowed down

vi. Logistic should be increased in accordance with increasing of staff.

vii. FMC study: PIC had submitted the expert's CV for endorsement from the employer. Waiting for the employer approval to commence the FMC study.

viii. The PIC continues to assist the PIU to review the CW-02 bid documents including drawings, technical specifications and BoQ. The inputs from the employer design consultants is necessary to finalize the design and drawings for CW-02 package.

The Contractor (CW01):

i. Upto to 30th June 2020, 607 days elapsed from 912 days, 305 days remaining. Planned progress refer to approved revised baseline schedule is 77 % but actual (financial) Progress is 45 %, 32 % behind the schedule due to embankment level issues and GFC drawing outfalls issues.

ii. Embankment level issues: As per PIC recommendation through 2D hydraulic modelling report, the embankment level for PTDP is finalized, which is issued to the contractor

iii. Outfall Issues: Due to the prolonged discussion on outfall dimensions between PCR project and PTDP, the contractor could not proceed with any of the outfall works. The size of the outfalls was finalised in May, and accordingly the GFC drawings for outfall No. 2, 2a and 4 were issued to the contractor on June 15th, 2020. The remaining outfalls are under process of design by the employer's design consultant.

iv. To maintain the approved / agreed temporary traffic management together with cooperation / coordination with the PCR's contractor throughout the project life.

v. To enhance the implementation of HSE rules and regulations for the project as set out in the HSE plan as well as updating the Health and Safety file as required.

vi. To implement flood protection measures and emergency plan for the ongoing monsoon.

vii. Fast track program and revised baseline schedule may need to be proposed so that the project completion could be achieved as per agreement and project delay can be minimized as much as possible.

viii. Although the work progress has been slowed due to exit of contractor's workforce, the contractor is advised to try and explore areas and means of getting additional workforce, including national workforce wherever available.

B.1.1. Contractual Issues

1. Milestone targets and corresponding Delay Damages: The existing milestones cannot be applied due to the following reasons:

   a. Partials handing over Diaphragm wall work stated in milestone A & B are not logical since CW01 need to continue the cast in situ wall and other related works
   b. CW01 working in scattered locations instead of following the work sequence of approved revised baseline schedule

c. Due to embankment level issues, CW01 scheduled work programme cannot be implied thoroughly
d. Since the outfall works needs to be redesigned, it will impact the milestone. Therefore, delay damages cannot be applied
e. World situations (COVID – 19) that will impact availability of materials, Equipments and Labours.

The work sectioning and milestones for delay damage is discussed in detail in the last QPR no. 6. Section B.3, clause 3.3. Further, vide letter dated 17th June 2020, PIC has advised PIU regarding the above issues and recommended PIU's endorsement on removing the existing milestone targets. PIU is yet to respond.

2. Extension of Time (EOT): CW01 has claimed for the EOT which PIC is currently under review process. In preliminary review indicates that the contractor will be eligible for EOT due to following reasons:

a. During the project execution, the PTDP embankment level had to be reconfirmed and re-evaluated through Topographic and Bathymetric Survey, followed by 2D Hydraulic Modelling analysis
b. Redesign of outfalls (still not completed) due to change in embankment levels
c. Current pandemic COVID-19 that will affect the availability of materials, equipments and labours which is important to run the project

3. Change in the contract price is expected due to the following:

I. Additional Work:
   a. Omchhu additional work from PTDP boundary to Omchhu bridge II Abutment upon the request from the Phuentsholing Thromde. The client and ADB endorsed the request. The design has been finalized and variation contract will be prepared by the PIC and submitted to PIU for review and onward to ADB for endorsement. Contract variation to the contractor will be awarded after official endorsement.
   b. Increase in Diaphragm Wall height due to change in bed level and embankment
   c. Increase in Cast In situ wall height due to rise in final embankment level
   d. Cow chain due to a mismatch in the BoQ quantity and the quantity calculated from the drawing
   e. Construction of spurs (2 nos) to avoid downstream impact
   f. Ducted outfall 2a due to previous non-inclusion in the original PTDP plan, but included in PCR plan
   g. Additional excavation required due to change in project levels

II. Deletion of Work:
   a. Reduced the D-Wall length by 60m at part 8 due to geological conditions
   b. Deletion of lower walkway at part I and II
   c. Deletion of Irrigation Works
   d. Modification of End Termination at Part 8 due to geological conditions
   e. Deletion of Ghat Access (3 Nos) recommended by River Engineer
   f. Deletion of Access (4 Nos)
   g. Change of OGL in general earth filling (401-406)
   h. Reduction of filling work volume due change in ground conditions and change in project levels

4.Quality of design consultant documents: Good for Construction (GFC) Drawings, Work item Statements in Bill of Quantities (BoQ) and Statement in Technical specification clauses often times found unclear and mismatch , causing confusing raising conflicts between the PIU / PIC and the contractor and hampering progress of the project.

B.1.2: Other issues:

1. Temporary Housing to combat COVID-19: Around 17 acres of PTDP filled area is used by the Government of Bhutan to construct temporary shelters for people living across the Border as mitigation measures to combat COVID-19 situation. These structures may last for a minimum of another one year. PIU have also utilized some filled area for construction of PIU camp facilities. Hence, total area of 31.57 acres at part 3 & 4 were handed over to the PIU by CW01 for the above purpose. Although the above settlement will not directly impact the progress of CW-01, but there will be associated risk during the construction activities. Phuentsholing Thromde is currently overseeing the management of the temporary housing area.

   However, these temporary structures will impact the CW-02 works if CW-02 commences before the intended period of the structures. Therefore, it becomes very important for PIU and client to initiate the award of the CW-02 package work after carefully analysing the site situation.

2. COVID -19 Pandemic: Due to the COVID-19 pandemic the possibility of enacting force majeure clause is foreseen. Bhutan is not under lockdown yet and construction work is progressing, although at slow pace with whatever manpower available at site. However, Project is facing difficulties in procurement of resources like workers, materials, equipment and unavailability of equipment spare parts, which may cause project delay. There is also a possibility that the contractor may claim due to rise in the cost of goods and manpower. Currently there is still no Standard Operating Procedures (SOP) from Government of Bhutan for entry permit of the foreign labour forces.

3. Completion of CW-01 package: The CW-01 is a 30 months project, the implementation of which started from 1st November 2018. Accordingly, the project is supposed to be completed by 1st May, 2021. However, due to various issues and challenges mentioned above (change in embankment design, outfall issues, COVID situation), coupled by the Omchhu additional works, the completion time of the project is likely to delay. PIC is currently under process of verifying the EOT claimed by CW-01, and will propose the workable time extension to the client for endorsement.

B.2 Proposed program of activities / work plan for the next quarter (01 July to 30 September 2020)

From PIU / PMU

- Update PTDP boundary due to the change of PCR project from 2 lane to 4 lane road
- Endorsement of Omchhu additional work from PTDP boundary to Omchhu Bridge II abutment
- Update PTDP master plan and incorporate necessary changes in coordination with HCP.
- Issue updated GFC drawings, mainly for outfalls, in coordination with HCP.
- Finalization of the CW02 bid documents in coordinaton with the PIC, the HCP and the ADB
- Instruction of all work variations after the ADB endorsement
- Submit SEMR to ADB for public disclosure.

From PIC

- Assist PIU/PMU for preparation and submission of the CW-02 bid documents to ADB
- Continue supervising Civil Works N°01 (CW-01) under FIDIC MDB June 2010 Contract
- Prepare and conduct training session for PIU & PMU
- Prepare SEMR for further submission to PIU
- Prepare response of the CW01 claims regarding:
  - Additional Excavation and Grabbing
  - Extension of time
  - Deletion of work
- Prepare instruction letters to the contractor once the PIU instruction are received

- Start Flood Management Consultancy:
- Reporting as per the project requirements
- Flood mapping: prepare flood inundation and flood hazard maps of PTDP area
- Sediment monitoring program

From Contractor

- Continue implementation of the C-EMP;
- Carry out HIV/AIDS and health disease awareness campaign at project periodically.
- Continue coordination with temporary traffics management for public vehicles with PCR as required
- Continue working on construction of Diaphragm Wall
- Continue working on General Earth Filling works
- Continue construction of Cast in Situ Wall
- Continue production of Precast Grass Paver Blocks and Tree pits
- Continue working on placing the boulders at front of D-walls
- Continue working on dead man anchor work
- Continue working on anchor slab work
- To start outfall works
- Continue nursery for sapling
- Start upper walkway retaining wall work
- Start stone in wire crates work
- Start lower walkway slab

C. Financial Management

C.1 Status of Contract Awards

Table 12:Status of Contract Award

Contract	Bid preparation	Bid period	Bid evaluation	Award & Negotiation	LTP
Civil works packages					
CW-01 River Training	Q1 2017	Q1& Q2 2017	Q2 2017	Q2 2018	12 Sep. 2018
CW-02 Common urban infrastructure	Q3 2019	Q3 2020	Q4 2020 & Q1 2021	Q1 2021	Q2 2021
CW-03 Flood early warning system	Q1 2021				
CW-04 Power transmission infrastructure	Q3 2020				
CW-05 ICT infrastructure	Q3 2020				
Consultancy services packages					
CS-01 PIC	Q1 2017	Q2 & Q3 2017	Q3 2017	Q3 2017	17 Sep. 2018
CS-01-CV-01 Environment monitoring expert	Q4 2018	Q1 2019	Q1 2019	Q2 2019	4 April 2019
CS-01-CV-02 Flood Management Consultancy	Q1 2019	Under the PIC contract as per Contract Variation (CV) no.2			
CS-03 Urban Management Advisor					
CS-04 Investment Promotion Advisor					
CS-05 Sustainable Township management capacity development consultants					
CS-06 Investor promotion and transaction advisory consultants					

Appendix 6 shows the Updated Procurement plan and Contract Award schedule. There is no change compared to the initial PAM Procurement Plan.

C.2 Disbursement of Project Funds

The total and breakdown of investment costs remain unchanged (see **Appendix 7**) as per the contract award. The invoice amounts are as follows (extracted from **Appendix 7**).

Table 13: Financial Status of PTDP Civil Works, Goods & Consultancy Contracts (PIC)

Investment costs	Contracts Amount (Taxes included)		Certified up to February 2020		Certified this Month*(March 2019)		Certified this Month*(April 2020)		Certified this Month*(May 2020)**		Total Certified*	
	Cur;	Amount	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Civil Works Contracts (CW-01)	BTN	2,934,669,207	1,169,795,424	39.9	105,014,267	3.6	67,772,702	2.3	67,466,914	2.3	1,410,049,306.54	48.0
Consultancy Services (CS-01 PIC)	USD	4,138,144	794,516	19.2	54,515	1.3	46,599	1.1	46,759	1.1	942,389.24	22.8
	BTN	91,474,227	29,747,638	32.5	2,226,535	2.4	2,326,752	2.5	2,094,527	2.3	36,395,453.62	39.8
Independent Environment Expert	BTN	5,425,417.25	611,395.00	11.27							611,395.00	11.27

* Amount of works and services billed in the table above excludes taxes and mobilization advances paid. It includes the 2% Government equity for Loan component (Consultancy payments).

Below table indicates the summary of disbursements for the reporting period showing actual disbursement amount by ADB against each Loan and Grant components, and the Government financing:

Table 14: Status of Disbursement of project Fund (till report period)

Category	Description/ Name	Budget Allocation (mil. US$)	Contracts Awarded (mil. US$)	Uncontracted Balance (mil. US$)	Total Disbursed (mil. US$)	Undisbursed Amount (mil. US$)
		(a)	(b)	(c) = (a - b)	(d)	(e) = (a -d)
Loan	Civil Works	15.05	15.05	0	0	15.05
	Consulting services *(PIC)*	7.42	5.27	2.073	1.340	6.070
	Independent Environment Expert		0.077		0.008	
	Others	6.28	0	6.28	0	6.28
	Total	**28.74**	**20.397**	**8.353**	**1.348**	**27.40**
Grant	Civil Works (CW-01)	19.57	19.57	**0**	19.570	0.00
	Others	**4.69**	**4.69**	0	1.15	3.54
	Total	**24.26**	**24.26**	**-**	**20.72**	**3.54**
DHI	PMU and PIU Expenditures	1.67	N/A		0.230	1.440
	Training	0.21	0	0	0.043	0.167
	Operation and Maintenance	0.86	0	0	0.190	0.670
	Others**	7.25	0		0.625	6.625
	Subtotal	**10.00**			**1.088**	**8.912**

*1US$ = 75.0 BTN

Appendix 8 displays the proposed S-curves and quarterly details for Loan 3668-BHU and Grant 0573-BHU contracts awards and disbursements (ADB disbursements only). The Reconciliation of disbursements and Status of External Audit is presented in **Appendix 8.4 and 8.5** respectively

C.3 Details of Counterpart Contribution

Within the report date, DHI has disbursed an amount of USD 1.8 Million as equity fund to CDCL from which the counterpart disbursements are made. The table below shows the status:

N°	Required Counterpart Expenditure by EA	Budget by DHI/CDCL till report period (2019 + 2nd Qtr 2020) (million USD)	Actual Amount Released (million USD)	Disbursed till June 2020 (million USD	Balance (million USD)
1	Non-Reimbursable (Activities fully funded by EA)	1.529	1.8	1.384	0.416
2	Reimbursable (from Loan)	Nil	Nil	N/A	Nil

C.4 Implementation Schedule

Appendix 2 display updated Implementation schedule for Outputs (actual vs. scheduled)

D. Environmental Aspects

D.1 Environmental Monitoring Review

A Summary of Environmental Monitoring Review from April 2020 – June 2020 is attached in **Appendix 9.**

In addition to above, there are some activities that have been carried out as part of the submission from the PIC or Contractor side during the quarterly review period, which is listed in the **Table 15** below:

Table 15: Environmental Deliverables

No	Subject/ Deliverables	Date
1	8th Terrestrial walkthrough was conducted at Zone A & B with attendance from PIU, PIC, AFCONs and Eco lab	16 & 17th April 2020
2	Surface water sampling for SW04 & SW05 was conducted	20th April 2020
3	PIU, PIC, CW01 and Ecolab meet to discuss the dysfunction of air monitoring equipment's	21st April 2020
4	9th Terrestrial walkthrough was conducted at Zone A & B with attendance from PIU, PIC, AFCONs and Eco lab	16th May 2020
5	Submission of Third Aquatic Report	14th May 2020
6	Surface water sampling for locations SW04 & SW05 & Groundwater quality testing at zone A was conducted	19th May 2020
7	Changed filter for the manually installed air monitoring equipment	23rd May 2020
8	Social Forestry Day was celebrated by conducting a mass cleaning campaign at the PTDP project site and tree planation at PIU camp	2nd June 2020
9	10th Terrestrial walkthrough was conducted at Zone A & B with attendance from PIU, PIC, AFCONs and Eco lab	17th June 2020
10	Surface water sampling for SW04 & SW05 was conducted	20th June 2020
11	Submission of fourth Terrestrial report	29th June 2020

Some environment-related issues had been observed as part of the monitoring at the project site. The major issues have been highlighted and observation/action taken has been duly reflected as follows:

- 4th April 2020: Submission of EMR by AFCONs to PIU & PIC
- 8th April 2020: AFCONs submitted noise monitoring location schedules to PIC and PIU for monitoring purpose.
- 16th April 2020: 8th terrestrial walkthrough was conducted by Eco lab along with PIU environment manager, PIC representative and AFCONs team.
- 20th April 2020: Surface water sampling of SW04 & SW05.
- 21st April 2020: PIU, PIC, CW01 and Ecolab meet to discuss the dysfunction of air monitoring equipment's
- 22nd April 2020: Submission of Third Terrestrial Report for period of December 2019 to February 2020

- 28th April 2020: Contractor's Submission for Engineer's approval of the substitution of Air monitoring equipment. Please elaborate that the other equipment was not functioning and that a request to use the manual machine, for the time being, was requested.
- 30th April 2020: Contractor submission for Engineer approval of the substitution of lab equipment
- For April 2020 approximately 1.67 metric tons of degradable waste and 1.3 metric tons of non-degradable waste was generated.
- 111 MT of Sodium Bentonite was used for April.
- April 2020: Water level change of 0.092m was noted since the initial measurement which was conducted on the 4th April and the last test on the 30th April 2020.
- 14th May 2020: Submission of Third Aquatic Report
- 16th May 2020: 9th terrestrial walkthrough was conducted by Eco lab along with PIU environment manager, PIC representative and AFCONs team.
- 19th May 2020: Surface water sampling for locations SW04 & SW05 & Groundwater quality testing at zone A was conducted
- 23rd May 2020: Changed Filter for Air Monitoring Device (PIU, PIC, CW01 & Eco Lab)
- Approximately 1.7 metric ton of degradable waste and 1.4 metric tons of Non-biodegradable waste was generated from the PTDP project in May 2020.
- May 2020: An average water level change of 0.262 m was noted since the initial measurement which was conducted on the 2nd and the last test conducted on 30th May 2020.
- 2nd June 2020: Social Forestry Day was celebrated by conducting a mass cleaning campaign at the PTDP project site and tree planation at PIU camp
- 17th June 2020: 10th terrestrial walkthrough was conducted by Eco lab along with PIU environment manager, PIC representative and AFCONs team.
- 20th June 2020: Surface water sampling for SW04 & SW05 was conducted
- 29th June 2020: Submission of Fourth Terrestrial report
- June 2020: Water level change of 0.529 m was noted since the initial measurement which was conducted on the 1st and the last test conducted on 29th June 2020.
- Approximately 1.5 metric tons of degradable waste and 1.3 metric tons of non-degradable waste was generated in June 2020.

E. Health and Safety

E.1 Health and Safety Updates

- Thermal fogging was done at office and camp area by Phuntsholing General Hospital on 8th April 2020 as a part of pest control measures
-
- 9th April 2020: Basic awareness message on prevention and control of dengue was conducted by Mr. Kinley Penjor from the vector-borne disease control programme. The session was attended by supervisors, officials and engineers from PIU, PIC and AFCONs

- 20th April 2020 thermal fogging was done by health officials from Phuentsholing General Hospital at PIU, PIC & AFCONs offices, supervisor's and Engineer's camp, PIU camp and washrooms.

- 21st April 2020 ECOLAB meeting regarding one of the air monitoring device was held at contractors conference room attended by PIU, PIC, AFCONs and ECOLAB.

- 25th April 2020: RBA, RBP & other officials conducted a meeting with PIU.

- 27th April 2020 HSE walkthrough report was submitted by AFCONs.

- There was an overflow of the septic tank in the portable toilet located in part 3, which was later mitigated with the help from municipality thromde.

- 15th May 2020: Temporary housing for Bhutanese people living across the border in Jaigoan was completed and inaugurated. This housing facility is a project initiated by His Majesty to provide housing for the Bhutanese who were brought back to Bhutan after the closing of the Bhutan India Border due to COVID-19. To ensure that there is no trespassing, AFCONs has built fencing along the housing area for the safety of the families and children.

- 28th May 2020: Information session on COVID-19 was conducted by AFCONs personnel, with representation from PIU, PIC and AFCONs. The session highlighted the current situation around the world, the number of cases reported, signs and symptoms to be aware of and preventive measure if in case one is infected or to avoid being infected.

- 28th May 2020: Information session on Rigging and Lifting Safety was conducted by HSE in charge to workers, supervisors and engineers on the standard operating procedures which need to be followed and the importance of wearing proper PPE.

- 28th May 2020: An emergency evacuation Mock drill and demonstration was conducted by AFCONs. It was attended by officials from PIU, PIC and AFCONs. This training was conducted to prepare employees to respond quickly, calmly and safely in case of a flood.

- 27th June 2020: Health awareness on COVID-19, HIV/AIDS, Dengue and Feminine Hygiene by Phuentsholing General Hospital. The awareness program was attended by personnel from PIU, PIC and AFCONs.

- 28th June 2020: Safety briefing was conducted by HSE in charge of topics related to rigging and lifting SoP, and the importance of PPEs.

- 29th June 2020: On the 29th at 11:30 PM Mr. Harjit Singh age 35, was injured while shifting bentonite bags from part 2 stockyard. Due to the excessive rain that Phuentsholing has received in the last few

weeks, and seepage from the bentonite bags had made the area slippery. This caused Mr. Harjit to slip with the heavy bentonite bags, which fell on his left leg. Work was immediately stopped and Mr. Harjit was taken to the Phuentsholing general hospital. Upon close examination of his fractured left leg, the Doctor decided to operate and fix plates on his left leg. He was kept in the hospital under observation and discharged on 4th July 2020.

- 30th June 2020: Safety briefing on electrical safety was conducted by HSE in charge of the Do's and Don'ts at the site and the importance of safety.

- Following the COVID-19 pandemic, AFCONs continues to monitor and conduct the following:
  - Checking the temperature of all workers every day
  - Submit a daily and weekly COVID report
  - Temperature guns have also been placed outside the project office entrance to check the temperature of all project and non-project people entering the offices
  - Request people to register manually or via Druk trace
  - Installation of water and soaps outside the office and labour camp entrances and at the project site where work is ongoing.
  - Awareness posters have been posted around the project site
  - Awareness program initiated by AFCONs as part of the health briefing was conducted by health officials from Phuentsholing General Hospital to caution and aware the workers of PTDP about COVID-19.

- All PPE gears are being provided to workers every morning by AFCONs. Continuous monitoring is being conducted to ensure the use of PPE. It was noticed during the site visit that some workers were not wearing their helmets, had torn gloves, and were not wearing their masks. This is also because most or all workers are not used to working with PPE and due to the weather condition in Phuentsholing. Yet it is still being strictly monitored and for those who are not in proper PPE are being handed with penalty slips by AFCONs.

- Dust control is being taken care of by sprinkling of water along the road and construction sites as and when required. A log sheet is maintained by the drivers to indicate the number of times and location the sprinkler truck is deployed.

Health and safety-related issues have been observed at the site as mentioned below:

Table 16: Recommendation for Health and safety issues

Issue	Recommendation and action taken
Removal of breeding sources	With the onset of COVID-19, the officials at the Phuentsholing General Hospital has been busy however with the constant request made by AFCONs thermal fogging was done on 8th April 2020 at the PTDP site. While tackling COVID-19, an outbreak of Dengue has also become of major concern with the onset of summer. AFCONs has already distributed mosquito nets and repellent to workers, but since the peak biting hours are during the day time, it would be important that the project HSE team locate all the sources housing the mosquitos, and immediately rectify it by removing the still water and by covering the area with sand.
Cleaning of all septic tanks	It is to be ensured that septic tanks and soak pits are cleaned every three to four weeks or as and when required. It would be unsanitary to have an overflowing tank, which would contaminate the soil and possibility of seeping into the river impacting the aquatic life and cause multiple health problems around the project.

E.2 Accident prevention

From April – June 2020, one serious incident was reported. 29th June 2020. Mr. Harjit Singh age 35, was injured while shifting bentonite bags at 11:30 PM from part 2 stockyard. Due to the excessive rain that Phuentsholing has received in the last few weeks, and seepage from the bentonite bags had made the area slippery. This caused Mr. Harjit to slip with the heavy bentonite bags, which fell on his left leg. Work was immediately stopped and Mr. Harjit was taken to the Phuentsholing general hospital. Upon close examination of his fractured left leg, the Doctor decided to operate and fix plates on his left leg. He was kept in the hospital under observation and discharged on 4th July 2020.

All other cases reported to the First Aid Station were minor issues. All issues or cases are registered at the First Aid Station located at the Project site. The signboard display with accident statistics has been erected at the entrance of the office zone.

E.3 HIV / AIDS Prevention

The 1st Health and Safety Campaign on "HIV / AIDS prevention, Malaria, Dengue Fever, and Menstrual Health and Safety" was conducted by Phuentsholing General hospital from 21st – 23rd March 2019 as reported in the 2nd QPR.

Due to the ongoing Dengue epidemic in Phuentsholing, it was difficult to bring in a health professional to conduct the health and safety campaign. To ensure the safety of the workers at the site, an information session on Dengue was jointly conducted by PIU, PIC & AFCONS safety and environment team on 7th & 8th August 2019. This session was conducted to inform and spread awareness to all the employees of PTDP project (especially the ones residing outside the project camps) on the outbreak of Dengue, and precautions, which need to be taken. As part of the initiative, mosquito repellent creams (ODOMOS) were distributed to all the participant to ensure necessary prevention of such diseases in future.

The health and safety campaign was delayed, but the 2nd camping was conducted on 16th October 2019, by an official from the Phuentsholing General hospital. AFCONS invited recruits from PIU, PIC and AFCONs, along with other employees who missed the last health briefing session which was conducted in March. The topics addressed were on Dengue, Hypertension, HIV/AIDS and Feminine Hygiene.

The 3rd health and safety campaign was conducted on 30th December 2019 by Mr. Kelzang Jigme, Anaesthetist from Phuentsholing General Hospital to the recruits and OJT students. The session focused on HIV/AIDS, Feminine hygiene and diabetes

The 4th health and safety campaign was conducted on 7th February 2020. With the outbreak of Coronavirus, AFCONs held a health awareness program for the project. They invited two doctors from Phuentsholing General Hospital to inform and demonstrate the project personnel's regarding the outbreak, how to wash their hands and other preventive measures.

The 5th health and safety campaign was conducted on 31st March 2020 by Kelzang Jigme from Phuentsholing General Hospital. The Heath briefing was focused on COVID-19, HIV/AIDS & Feminine Hygiene. The session was conducted by Mr. Kelzang Jigme, Anaesthetist from Phuentsholing General Hospital. The session was attended by 24 participants out of which eight were women from PIU, PIC and AFCONs.

The 6th health and safety campaign was conducted on 27th June 2020 by Dr. Kelzang Jigme, Anaesthetist, Dr. Thinley Pelzang, Chief Medical Officer (CMO), Phuentsholing General Hospital, Dr. Chencho Dorji, CMO, Gidakom and Sithar Dorji, Clinical Nurse. The core focus of the awareness was on COVID-19, but topics regarding HIV/AIDS, Dengue and Feminine Hygiene was also covered. The awareness program was attended by personnel from PIU, PIC and AFCONs.

E.4 Impact of COVID-19

On 31st December 2019 the COVID-19 pandemic initially started from Wuhan, China and eventually spread to many countries around the world and in due course, the World Health Organization declared it as a Global Pandemic. The first confirmed case of COVID-19 in Bhutan was announced on 5th March 2020. This pandemic has affected the livelihoods and has tremendously impacted the social and economic development of many countries.

The PTDP Health Safety and Environment team has established a workplace safeguard protocol to be followed as a means of mitigating risk and to prevent the spread of the virus in the project area. Please refer to Appendix 20 for the detailed SoP.

With the outbreak of COVID-19, the border between India and Bhutan have been closed for the past few months, which has dramatically impacted the businesses in Bhutan. Border closure has also had a direct impact on the PTDP project, with no day laborers, limited raw materials and additional machineries/spare parts allowed into the country. With lack of required materials, machineries, and workers, it has slowed down the progress of the work.

E.5 Traffic Safety

On 1st March the contractors constructed traffic diversion and rerouting for third party vehicles. This was initiated because the number of third-party vehicles plying along the approach road to the project office site was increasing, and was not abiding by the enforced speed limit, making it risky for PTDP passer-by's, generating dust and degrading the air quality in the locality. After the diversion, AFCONs was able to manage the speed limit to the project vehicles, making it safer for the PTDP passer-by's and also not generating as much dust. 9th August 2019, another road was diverted at part 3, which is only accessible for project vehicles. This has drastically reduced the number of private vehicles plying at the project site, which has in return made it easier to monitor the speed limit. The detail on the traffic study is attached as **Appendix 5**.

E.6 Labor Engagement Statistics at the end of the Reporting Period

The contractor only recruits Bhutanese with proper documents and other foreign workers with authentic permits. Work permits are issued to all the Non-Bhutanese Engineers, workers and labours working in Bhutan. As of June 2020, the contractor has employed the following:

- Bhutanese Day Labour (Female) – 19
- Bhutanese Day Labour (Male) – 27
- Bhutanese Residential Labour (Male) – 18
- Non-Bhutanese Day Labour (Male) – 0
- Non-Bhutanese Resident Labour (Male) – 159

The labour register and muster roll of the main contractor are maintained and updated.

E.7 Engagement of Vehicle, machines and equipment

The contractor has deployed various vehicle, machines, and equipment at the site either directly or through subcontractors. Vehicles are also checked for proper registration, fitness, and emission certificates. Please refer to **Appendix 14** for all vehicle clearance certificate.

F. Social Safeguard and Communication

F.1 Social Safeguard

No specific action conducted this quarter

F.2 Communication action (website, events…)

CDCL Information Technology team visited the project site on 26th March 2019 and has developed the CDCL website. Information on the PTDP is already available in CDCL website (www.cdcl.bt).

See **Appendix 4** for a comprehensive list of meetings

F.3 Updated Stakeholder Communication Plan

The Project Administration Manual has developed a stakeholder communication plan which was updated as follows:

Table 17: Updated stakeholder communication plan

Project information to be communicated	Means of communication	Resp. Agency	Audience(s)	Frequency
Report and Recommendation of the President	ADB Website (linked documents)	ADB	ADB, DHI, CSOs, beneficiaries and RGoB	Once at Project inception
Procurement and bidding documents	Invitations for bids published on the DHI and CDCL websites and in the newspapers. Information for pre-bid meetings to be published likewise	PMU	Contractors and local suppliers of goods and services ADB, DHI, CDCL	During the procurement period. 1. Project Quarterly Report 2. As per the procurement plan
Construction	The selected construction company(s) will ensure that the construction areas will have signage boards with their contact information	PIU	ADB, DHI, CDCL, Stakeholders	During the construction period. Reported Monthly in Monthly Progress Report
Progress status during construction works and construction issues	Signage boards on site	PIU	ADB, DHI, CDCL General Public	During the construction period. 1. Reported Monthly in Monthly Progress Report 2. For the general public. Within Specific Public event (once a year)
Project performance reports	ADB and DHI Websites	ADB and DHI	Beneficiaries, stakeholders and RGoB	Either Semi-annually or annually once DMF (Design and Monitoring Framework) is set-up.
Safeguard monitoring (Environment and Social monitoring reports)	ADB websites	ADB and CDCL	ADB, DHI, CSOs, beneficiaries and RGoB	Semi-annually (January – June & July – December)
Project completion Report	ADB Websites	ADB and CDCL	ADB, DHI	At Project closure

G. Grievance Redress Mechanism

G.1 Grievance Redress Mechanism set-up

A two-tier mechanism is adopted by the project. The first tier is in the field at the PIU level led by PIU head and the second level/tier GRM is led by the PMU head.

Secretariat

The first level secretariat of GRM is established in the PIU office, with PIC/PIU's Health and Safety officer acting as the secretary.

Composition

At the first level GRM, the team called the 'Grievance Redress Committee (GRC)' is established at the PIU level and consist of the PIU head as the lead of GRC. The composition of the first tier GRM is shown in Table 1 hereafter.

Table 18: Composition of the First tier GRM

Organization	Positions	Names
PIU	Project Manager	Mr. Kamal Dhakal
PIU	Dy Project Manager	Mr. Lhendup Dorji
PIU	Environment Manager	Mr. Pemchung
PIC	Team Leader / Dy Team Leader	Mr. Edwin Anggrijatno
PIC	Safeguard and H&S Specialist	Mr. Megay Penjore
Phuentsholing Constituency	Representative	Mr. Nar Bahadur Rai
Phuentsholing Thuemi	Representative	Mr. Sonam Tenzin
RENEW (Community-based org.)	Representative	Ms. Dechen
Members on-call basis based on the nature of grievance representing relevant section of district office		
Contractor CW-01	Project Manager	Mr. Ravichandran

The composition of the second tier GRM is shown in Table 19 hereafter:

Table 19: Composition of the Second Tier GRM

Organization	Positions	Names
PMU	Project Director	Mr. Tshering Dupchu
PMU	Urban Planner	Ms. Kamala Thapa
PIU	Project Manager	Mr. Kamal Dhakal
PIU	Environment Manager	Mr. Pemchung
Central Government / MOWHS	Representative	Mr. Namgay Tshering
RENEW (Community-based org.)	Representative	Ms. Lhaden

G.2 Revised GRM

As part of the site visit by PIC environmental specialist to review and approve the draft CEMP, revisions were proposed in the draft GRM which was endorsed by ADB as part of the CEMP. The changes made were as follows:

Table 20: Comments and observation on GRM by PIC

Chapter; Section Comment	Comment
Issues	It should be mentioned that Grievances related to the Social and Environmental Concerns of the project shall be covered by the GRM
Complaint/ Feedback/ Dropbox	Shall be at the contractor's site office and PIU office with a proper signboard with names and numbers of contact person at all these locations.
Dealing with complaints	It was suggested that minor issues/complaints received may be dealt by PIU and contractor directly as appropriate. But proper recording should be done and reported to the committee.
Register of complaints	All complaints received- written, telephonic, email, verbal, anonymous etc shall be recorded and verified. A proper register should be maintained and reported to the GRM committee.
Corrective Measures to be done by the contractor	Please include how corrective measures would be addressed and borne by the contractor

All the comments have been incorporated and are part of the GRM in the CEMP

G.3 Grievances registered

- No grievances have been registered for the months of April – June 2020
- Grievance reporting format has also been uploaded on the CDCL website (www.cdcl.bt/ptdp/).

H. Design Monitoring Framework and actions agreed during last ADB review mission

H.1 Performance against DFM Indicators

Status of performance against Project Design and Monitoring Framework indicators is shown in **Appendix 1**. Compliance with loan and grant Covenant updated table is attached in **Appendix 11.**

H.2 Action agreed during last ADB review mission

The last ADB mission was from 16th – 18th March 2020 and the subsequent agreed action schedule is shown in table 21 below:

Table 21: Status of actions agreed during last ADB review mission (March 2020

Sl.No	Activities	Due date (ADB)	Responsibilities	CDCL Proposal	Remarks
1	**Project Management**				
1.1	Submit the additional details required for annual report 2019	30th April 2020	PMU	Done	
1.2	Submit Quarterly Progress Report to ADB (include PPMES)	30th April 2020	PMU/PIU	Done	
1.3	Update the RMP	Every Quarterly	PIU/PIC	being complied	
1.4	Coordination meeting with PCR and LAP (dust suppression and traffic management	Monthly	PIU/PIC	being complied	
1.5	Fully staff PIU	April, 2021	PMU/PIU/CDCL	being complied	
1.6	Organize Project Coordination Meeting with PCR and MoWHS	20th April 2020	PMU/PIC	Done	
2	**Flood Forecasting**				
2.1	Flood Management Plan Shared with ADB	30th April 2020	PIU/PIC	Done	
2.2	NCHM MOU shared with ADB	31st May 2020	PMU/PIU	Under process	by August 2020
3	**CW01**				

3.1	Way Forward on Outfall Dimension Change and Updated, Masterplan Submitted	May 2020	PIU/PMU/PIC	Done	Master-plan being updated
3.2	Gantt Chart for CW01 and CW02 Submitted	31st March 2020	PIU/PIC	Done	
4	**CW02**				
4.1	Submit updated SAP timelines to ADB	15th April 2020	PMU/DHI	Done	
4.2	PIU to submit CW02 Bid Documents to ADB	15th April 2020	PMU/PIU	Draft submitted on June 23rd	
4.3	Obtain MOU with PT for cooperation and modus of operation in the development of the PTDP	30th April 2020	PMU	as per updated SAP timelines	
5	**CW-04 & CW-05**				
5.1	BPC and BTL MOU shared with ADB	15th April 2020	PMU/PIU	BPC & BT mobilized to prepare cost estimates & plans for force account works	
6	**Safeguards**				
6.1	BMBMS recruited under PIC (requirement to be decided)	Immediate	PIC	Deferred	BMBMS cannot be initiated at the moment due to interface issues with ongoing works by private parties at Zone-C. Dateline proposed to be deferred as requested vide PMU letter dated Feb 10, 2019.
6.2	Public consultation Meeting	On-going	PIU	Agreed	
6.3	Final EMR Covering Jan to June 2020 submitted	July, 2020	PMU	Agreed	By July end 2020
6.4	Conduct one round of pest control at labour camps	30th June 2020	PIU	Fogging done on 20th May 2020	new pesticides not approved by authority
7	**Finances**				
7.1	Submit 2019 APFS to ADB	30th June 2020	PMU	Submitted	

Table 22: Strategic Action Plan (Updates) - Phuentsholing Township Development Project

Sl. No	Action / Activity	Timeline	Responsibility	Source of funding Package	DHI Remarks	Revised Dates
Legal and Policy						
1	**Due diligence.** Complete legal due diligence of the proposed institutional options and recommend legal and/or policy changes required for operationalization of the separate Development Authority and special planning area; help to ensure common understanding on details of the institutional arrangement; review implications of the Special Planning Act, which is currently under development	1-Jul-17	ADB/CDCL	Legal Expert mobilized through ADB RETA no. 9050		
2	**Legal or policy framework.** Initiate approval for necessary policies or regulations - e.g. development control regulations. Note: Development control regulations are approved by the National Consultative Committee for Human Settlements (NCCHS), which is chaired by Minister, Ministry of Works and Human Settlement (MOWHS).	31-Dec-19	CDCL		Draft DCR is ready. The Draft DCR is currently being reviewed internally to revalidate earlier assumptions. We propose for finalisation internally first and then initiate for approvals in a timeframe of about one to one and half years	30-Jun-21
Institutional						
3	**Roles and responsibilities.** Define and agree on all relevant agencies' roles and responsibilities for all aspects of township management and services delivery; and identify opportunities for outsourcing and sharing facilities/services. (e.g. for water supply, sanitation, solid waste management, public spaces, emergency services, tax collection, enforcement of bylaws, city services (e.g. issuing identification cards), and others	31-Dec-19	CDCL/Phuntsholing Thromde/MoWHS	Government consultant to provide recommendations	There are clarity on certain matters while other matters are being pursued. With the project in an early stage of implementation, it is seen that more time will be necessary to define, agree and on the roles. The timeline is proposed to be moved by about one year	30-Jun-22
4	**Financial flows**. Clarify all revenue collection, revenue-sharing arrangements/amounts and financial flows between CDCL and Phuentsholing	31-Dec-19	CDCL/Phuntsholing Thromde/MoWHS	Government consultant to provide recommendations Stakeholders to finalize	The project is at a early stage of implementation. We propose for the timeline to be	31-Dec-22

	(i.e. from fees, land tax, property tax, building permit fee, etc.). Determine mechanism and process for periodic review of financial related agreements.			through consultation meetings	shifted by one and half years.	
5	**Agreements.** Draft and sign MOU or appropriate agreement(s) between CDCL and Phuentsholing Thromde to clarify and confirm delineation of roles and responsibilities for township management and financial aspects; and seek endorsement from MoWHS.	31-Dec-19	CDCL/Phuntsholing Thromde/MoWHS		The Project is at an early stage of implementation. We propose for the Timeline to be shifted by one and half years.	31-Dec-22
6	**Operational systems.** Develop detailed plan to establish the required city management systems in the new township (e.g. computerized billing and accounting system, integrated property tax system, house numbering system, GIS, customer service center, etc.) Finalize detailed terms of reference for contract package CS-05: Sustainable township management capacity development. Finalize detailed terms of reference for contract package CS-05: Sustainable township management capacity development.	31-Jan-20	CDCL	Individual loan consultant recruited by CDCL	Given the stage of the implementation of the Project, it is proposed to change the timeline by one year	31-Dec-22
7	**Financial Sustainability.** Establishing volumetric water tariffs (including sewerage surcharge) and sustainable tariffs for other services (solid waste, power, and telecoms) targeting full cost recovery within 10 years of construction. This will include frameworks/ legal agreements for phased incremental tariff increases required for full cost recovery and achievement of near 100% tariff collection rates.	15-Jun-20	CDCL/Phuntsholing Thromde	CDCL internal budget with support/recommendations from CS-03 Consultant	The Project is an early stage of implementation. We propose this to be shifted by One and half years.	30-Jun-23
8	**Determine service standards.** CDCL to develop service standards it aims to achieve and maintain from 2027 onwards; the modalities to achieve these (e.g. service contracts, outsourcing, etc.); and monitoring mechanisms.	15-Jun-23	CDCL	CDCL internal budget with support/recommendations from CS-05 consultants		30-Jun-23
Human Resources						

9	Determine CDCL staffing requirements and finalize recruitment plan for the first 5 years of township operations (i.e. 2022-2026)	30-Dec-21	CDCL	Individual Loan consultant		31-Dec-22
10	Finalize recruitment of CDCL township management core staff	31-Mar-22	CDCL			31-Mar-23
11	Develop detailed capacity building plan for CDCL and Phuentsholing Thromde19 and commence implementation	1-May-22	CDCL	CS-05		31-Dec-22
12	Determine Phuentsholing Thromde staffing requirements to be effective in supporting the new township, and cope with increased volume of visitors expected	15-Apr-22	Phuntsholing Thromde	CS-05		31-Dec-22
13	Finalize recruitment of additional Phuentsholing Thromde staff Note: recruitment takes about 6 months	15-Oct-22	Phuntsholing Thromde/MoWHS	Central Government		31-Dec-22

H.2.1 Risk Management Plan

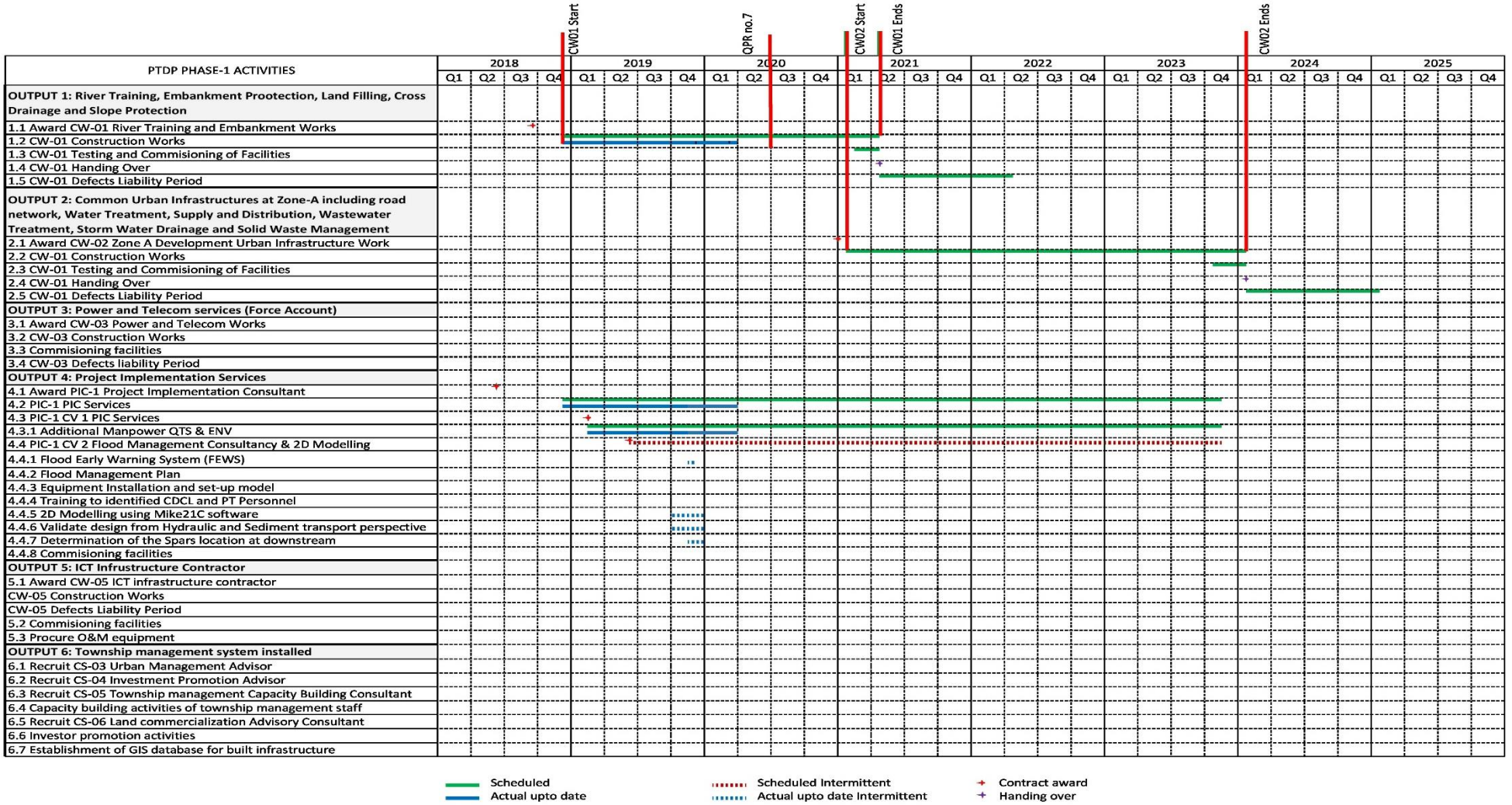
The Risk Management Plan (RMP) is updated every quarter, and has been submitted as part of the Quarterly Progress Report (QPR No. 7), for the period 01 April – 30 June 2020, attached in **Appendix 15**.

Appendix 1: Design and Monitoring Framework

	Indicator	Progress till 31st March 2020
Outcome Phuentsholing's urban area protected from floods and expanded with improved amenities and services	By 2026: a. Phuentsholing and reclaimed land protected from 100-year flood events in the Amochhu River (2018 baseline: Phuentsholing is protected from mean annual floods) b. At least 10% of fully serviced plots tendered for development (2018 baseline: NA)	a. First assessment of the progress of achievement when cast-in-situ wall achieved. Q2/2020. b. confirmation of tender scheduleQ2/2024
Outputs 1. Flood and erosion protection measures installed	By 2025: 1a. 4 km of climate and erosion-resilient river walls constructed to protect against 100-year probable flood (2018 baseline: 0) 1b. At least 66 ha of land reclaimed (2018 baseline: 0) 1c. A flood early warning system and community-based flood management plan established and operational (2018 baseline: NA)	1a. Construction of river protection started in Jan 2019. 86% Achieved. 1b. Construction of backfilling started in Feb 2019. 39.8 % Achieved. Land reclaimed when walkways finished. 1c. CW03-Not yet started. FEWS to be installed from Q2/2020 to Q4/2021
2. Municipal infrastructure constructed	2a. 10 km of roads with footpaths, landscaping, and streetlights planned with at least 30% female participation (2018 baseline: 0) 2b. Water treatment plant with a capacity of 4 MLD constructed (2018 baseline: none) 2c. 12 km of new primary and secondary water mains constructed (2018 baseline: 0) 2d. 9 km of new sewer mains and 9 km of new storm drains constructed (2018 baseline: 0) 2e. A sewerage treatment plant with a capacity of 3 MLD constructed (2018 baseline: 0) 2f. A resource recovery system for solid waste management installed (2018 baseline: 0) 2g. A 630 KVA grid substation constructed (2018 baseline: 0) 2h. 16 circuit-km of 415-volt power distribution lines installed (2018 baseline: 0) 2i. 11 circuit-km of telecommunication transmission cables installed (2018 baseline: 0)	To be started with CW-02, CW-03, CW-04 & CW-05 start. 2a. To be assessed from Q3/2021. 2b. To be assessed from Q3/2021 2c. To be assessed from Q3/2021 2d. To be assessed from Q3/2021 2e. To be assessed from Q3/2021 2f. To be assessed from Q3/2021 2g. To be assessed from Q2/2022 2h. To be assessed from Q2/2022 2h. To be assessed from Q2/2022
3. Township management systems installed	3a. At least 80% of township management staff reported improved knowledge of modern urban management (2018 baseline: NA) 3b. An asset management system established with 100% of project infrastructure and facilities geocoded in a database (2018 baseline: NA) 3c. At least 10 potential investors attended investor outreach campaigns (2018 baseline: NA)	3a. First assessment in the Year 2024 3b. To be assessed from Q2/2022 3a. To be assessed on Q3/2024

Appendix 2: Updated Implementation Schedule for PTDP and Gantt Chart for CW-01

Appendix 2.1: Updated Implementation Schedule for PTDP



Appendix 2.2: Revised Gantt Chart for Package CW01

GANTT CHART FOR PACKAGE CW01, PHUENTSHOLING, BHUTAN

PROJECT COMPLETION AS PER BASELINE SCHEDULE

PROJECT COMPLETION AS PER EXPECTED EXTENSION

Sl. No.	Description	Contract Amount (Nu. in million)	Achieved Amount (Nu. in million)	% Achieved	Jan/19	Feb/19	Mar/19	Apr/19	May/19	Jun/19	Jul/19	Aug/19	Sep/19	Oct/19	Nov/19	Dec/19	Jan/20	Feb/20	Mar/20	Apr/20	May/20	Jun/20	Jul/20	Aug/20	Sep/20	Oct/20	Nov/20	Dec/20	Jan/21	Feb/21	Mar/21	Apr/21	May/21	Jun/21	Jul/21	Aug/21
	PTDP Contract Package CW-01				68,71	154,76	250,02	342,21	453,78	569,87	685,19	807,52	934,14	1056,65	1155,11	1312,79	1492,52	1673,40	1842,11	1999,12	2097,19	2169,16	2250,81	2303,66	2342,41	2387,69	2404,42	2421,62	2427,01	2430,20	2433,73	2434,30				
a	River Training Works	1.090,26	845,18	78%	49,68	49,68	55,01	53,23	72,16	77,13	75,07	81,98	82,91	79,76	65,39	85,68	72,94	80,15	64,76	44,74															
	Diaphragm Wall	830,42	710,22	86%																															
	Cast In-situ Wall	100,52	118,02	117%																															
	Anchor Slab	79,79	2,06	3%																															
	Deadman Anchor	41,54	14,88	36%																															
	Anchor Bar	37,99	-	0%																															
b	Embankment	694,13	33,86	5%	6,34	12,69	14,05	13,59	14,05	13,59	14,05	14,14	18,54	14,91	5,43	34,91	65,28	70,38	75,23	73,37	74,80	55,25	64,37	35,63	1,73	1,79									
	Embankment Filling	30,12	6,89	23%																															
	Stone Wire Crates	106,64	-	0%																															
	Retaining Wall	199,41	5,19	3%																															
	Ducted Outfall	190,31	4,34	2%																															
	Open Outfall	133,25	17,43	13%																															
	Access & Ghats	21,10	-	0%																															
	Hil Slope Stability	13,30	-	0%																															
c	General Earth Filling	429,53	130,48	30%	12,68	23,67	26,21	25,37	25,37	25,37	26,21	26,21	25,37	26,21	25,37	26,21	26,21	14,37	12,68	26,21	9,30				20,29	26,21									
	General Earth Filling	429,53	130,48	30%																															
d	Promenade Finishing	149,72	24,35	16%										1,44	2,27	7,81	11,76	11,01	11,76	10,78	11,76	11,38	11,76	11,76	11,38	11,76	11,38	11,69							
	Lower Walkway	33,62	0,09	0%																															
	Upper Walkway	116,11	24,25	21%																															
e	Irrigation & Landscape Works	70,66	-	0%												3,08	3,53	4,97	4,26	1,92	2,20	5,34	5,52	5,45	5,34	5,52	5,34	5,52	5,39	3,19	3,53	0,57			
	Irrigation Works	47,74	-	0%																															
	Landscape Works	22,92	-	0%																															

The expected time extension considering below points

1. Ground level difference and change in Embankment height
2. Change and redesigning of Outfalls in order to match with PCR Design
3. Additional Work at along Omchu

Further possibilty of negative Impact for the completion of the Project

1. Covid 19 Pandamic negative Impact on project logistcs and resources
2. Possible impact due to Monsoon

Legend

Duration as per Contractor's Baseline Schedule

Expected Time Extension for completing the Project

Appendix 3: PMU, PIU and PIC Staffing Details

STAFFS OF PHUENTSHOLING TOWNSHIP DEVELOPMENT PROJECT, CDCL

Project Management Unit (PMU), CDCL

Sl.No	Name	Function	Remarks
1	Chief Executive Officer	Mr. Phuntsho Gyeltshen	
2	Acting Chief Executive Officer	Mr. Karma Gayley	
3	General Manager, Finance and Investment Division	Ms. Dechen Wangmo	
4	Project Director	Mr. Tshering Dupchu	
5	Finance Manager	Mr. Phurba Dorji	
6	Project Accountant	Mr. Sherab	
7	Urban Planner	Ms. Kamala Thapa & Mr. Pema Wangchuk	
8	Legal Officer	Mr. Kinley Dorji	
9	Human Resources Manager	Mr. Kencho Tshering	

Project Implementation Unit (PIU), CDCL

Sl.No	Function	Name	Remarks
1	Project Manager	Mr. Kamal Dhakal	
2	Dy. Project Manager	Mr. Lhendup Dorji	
3	Environment Manager	Mr. Pemchung	
4	Stakeholder Manager	Mr. D.B Ghalley	
5	Adm.Officer (Document Control)	Ms. Tshering Pelden	
6	Water / Sewer Specialist	Mr. Kharsang Norbu	Part time
7	Site Inspector -1	Mr. Prem Kumar Ghalley	Deputed under PIC
8	Site Inspector -2	Mrs. Kencho Wangmo	
9	Land Topography Surveyor	Mr. Namgay Wangchuk	
10	Land Topography Surveyor	Mr. Karma Wangchuk	
11	Lab Technician	Ms. Tandin Wangmo	
12	Site Inspector – 5	Ms. Jangchu Pelden	
13	Site Inspector – 6	Mr. Tshering Samdrup	
14	Civil Engineer	Mr. Thinley Yoezer	
15	Electrical Engineer	Ms. Sangay Wangmo	
16	Asst. Document controller	Ms. Kezang Lhaden	
17	Driver	Mr. Rinzin Dorji	

Project Implementation Consultant (PIC)

Sl.No	Function	Name	Remarks
1	Team Leader / Chief Resident Engineer	Mr. Mehmet Kahraman	
2	Deputy Team Leader/RE	Mr. Edwin Aggrijatno	
3	Construction Manager/QLE	Mr. Sonam Tobgay K	
4	Material Engineer	Mr. Dwarika Gotamey	
5	Quantity Surveyor	Mr. Karma Dezang	
6	National Hydraulic Engineer/ FEMS Specialist	Mr. Chhimi Dorji	Intermittent

7	Safeguard and Communication Specialist	Mr. Megay Penjore	Intermittent
8	Environmentalist	Ms. Sonam Deki	Intermittent
9	Office Manager	Ms. Sangay Choizom	
10	Accountant	Ms. Dorji Lhamo	
11	Assistant Office Manager	Ms. Namgay Lhamo Tenzin	
12	MIS/IT	Mr. Pema Namgay	
13	AutoCAD	Mr. Phuntsho Namgyal	
14	Site Inspector – 3	Mr. Tashi Namgyel	
15	Site Inspector – 4	Mr. Yeshi Jamtsho	
16	Lab Technician	Ms. Yangchen Seldon	
17	Driver	Mr. Suresh Rai	
18	Driver	Mr. Choki Dorji	
19	Messenger	Ms. Yeshi Dolma	

Intermittent key experts will be present as per their requirement.

The international intermittent experts are not included in the above list.

Appendix 4: List of particular meetings, training/workshops and visits

Appendix 4.1 List of particular meetings from 1st April 2020 to 30th June 2020

Sl. No	Subject	Date	Location	Attendee
1	CEO & Director, Druk Holdings & Investments & Acting CEO, CDCL Meeting	20th April 2020	PIU Meeting Room	DHI CDCL PIU
2	Royal Bhutan Army, Royal Bhutan Police & other officials Meeting with PIU	25th April 2020	PIU Meeting Room	RBA RBP & Other Officials PIU CW01
3	Coordination Meeting – 05 (PMU/PIU, PIC CW01)	30th April 2020	CW01 Conference Room	PMU/PIU PIC CW01
4	Analyst, DHI & PD, PMU (CDCL)	28th May 2020	PIU Meeting Room	DHI PMU PIU
5	Bhutan Power Corporation Limited Meeting	05th May 2020	PIU Meeting Room	BPC PIU PIC
6	Presentation of CW-02 package to PMC and DHI management	17th & 18th June, 2020	CDCL/DHI office, Thimohu	DHI, CDCL, PMU, PIU
7	Presentation & Meeting on CW-02 Package	22nd June 2020	PIU Meeting Room	PIU PIC
8	Discussion with Architect, CDCL on finishing works	26th June 2020	PIU Meeting Room	CDCL/PIU PIC

Appendix 4.2 List of training and workshops from 1st April 2020 to 30th June 2020

Sl. No	Subject	Date	Location	Attendee
1	Basic Awareness Program on Prevention and Control of Dengue by Mr. Kinley Penjor from Vector Borne Disease Control Programme	09th April 2020	CW01 Conference Room	PIU PIC CW01
2	ECOLAB & PTDP HSE Team Meeting regarding Air Monitoring Device	21st April 2020	CW01 Conference Room	PIU PIC CW01 (HSE Team) ECOLAB
3	Training by CW01 on Emergency Flood Evacuation, COVID-19 and Rigging & Lifting Safety	28th May 2020	Part 2	PIU PIC CW01
4	Health Awareness Session by Phuntsholing General Hospital on COVID-19, Feminine Hygiene, Dengue/Malaria & HIV/AIDS	27th June 2020	CW01 Conference Room	PIU PIC CW01

Appendix 4.3 List of visits from 1st April 2020 to 30th June 2020

Sl. No	Subject	Date	Location	Attendee
1	CEO & Director, Druk Holdings & Investments & Acting CEO, CDCL	20th April 2020	Project Site	DHI CDCL PIU
2	Bhutan Power Corporation Limited & Telecome officials	05th May 2020	Project Site	BPC PIU PIC
3	Inauguration Ceremony of Emergency Housing Settlement	15th May 2020	Part 3 & Part 4	Ministers, Executives, RBA RBP Thromde & Other Officials PIU CW01

Appendix 5: Traffic study

The project has the Samtse-Phuentsholing highway running along its boundary and at the northern end of the project site lies a private quarry. This quarry has one of its approach road crossing the project diaphragm wall alignment. Every day heavy vehicles ply on this road which poses risk to the project vehicles as well as the project employees. Often heavy vehicles are seen speeding on this road that not only generates a lot of dust but also poses risk to the project workers. Despite speed breakers and speed limit signage that have been placed at strategic locations, the risk factor is still present.

After the road diversion works done on 1st March 2019, the approach road to the project office site is safe as compared to the months before that. Now it is mainly the project vehicles plying in and out of the site, small private vehicles dropping off individuals working in the project or heavy vehicles transporting construction materials to and from the project site. On 9th August 2019, another road was diverted at part 3, which is only accessible for project vehicles. This has drastically reduced the number of private vehicles plying at the project site, which has in return made it easier to monitor the speed limit.

To illustrate interference with third parties' vehicles, PIC asked the Contractor to conduct simple traffic counts to identify the vehicle type and origin. The traffic counts shown below are for the months from April – June 2020. **Table 1** below gives the traffic results, which shows that the road used by the project vehicles is minimal in comparison to third party vehicles.

Table 1: Traffic counts from April – June 2020

DAY								
Location / Date / Time	**Project LV**	**Project HV**	**Trailer**	**Project Total**	**Others LV**	**Others HV**	**Trailer**	**Others Total**
18/04/2020	130	101	12	**243**	378	933	3	**1314**
NIGHT								
Location / Date / Time	**Project LV**	**Project HV**	**Trailer**	**Project Total**	**Others LV**	**Others HV**	**Trailer**	**Others Total**
19/04/2020	32	13	0	**45**	153	207	2	**362**
DAY								
Location / Date / Time	**Project LV**	**Project HV**	**Trailer**	**Project Total**	**Others LV**	**Others HV**	**Trailer**	**Others Total**
11/05/2020	146	60	8	**214**	235	338	0	**573**
NIGHT								
Location / Date / Time	**Project LV**	**Project HV**	**Trailer**	**Project Total**	**Others LV**	**Others HV**	**Trailer**	**Others Total**
16/05/2020	18	07	0	**25**	244	251	0	**495**
DAY								
Location / Date / Time	**Project LV**	**Project HV**	**Trailer**	**Project Total**	**Others LV**	**Others HV**	**Trailer**	**Others Total**
26/06/2020	199	14	0	**213**	1061	494	0	**1555**
NIGHT								
26/06/2020	11	07	0	**18**	217	86	0	**303**

Result

- The day survey is conducted from 8:00 AM – 5:00 PM with a lunch gap of one hour
- The night survey is conducted from 8:00 PM – 8:00 AM

In comparison to past traffic survey, there has been a slight decrease in project vehicles. This is mainly due to the current COVID-19 pandemic which has closed borders to stop the spread of community transmission, due to which there are not many third party or project vehicles plying in the project materials with construction materials. The number of third-party vehicles has also slightly reduced due to the current poor road conditions from the continuous rainfall and the ongoing development projects.

Appendix 6: Updated Procurement Plan and Contract Award Schedule

Phuentsholing Township Development Project

No.	Package	Procurement Plan Amount($ millions)		Note	Type	Implementation Period	Current Status of Designs/Bid Documents	Submission Date to CDCL	Submission Date to ADB for Clearance	Advertize Bid	Bids Submitted	Submission Date of TDER to ADB for clearance	Submission Date for FBER to ADB for Clearance	Target date of Contract Award	Start Date
Works & Goods															
1	CW-01	35	River training and land reclamation	1	ICB	Q4-2018 to Q2-2022			14-Mar-17	25-May-17				18-Jul-18	27-Aug-18
2	CW-02	11.2	Common Urban Infrastructure		ICB	Q3-2021 to Q2-2024		10-Dec-20	24-Dec-20	28-Jan-21	11-Mar-21	8-Apr-21	13-May-21	3-Jun-21	1-Jul-21
3	CW-03	0.2	Flood warning system		ICB Goods	Q2-2020 to Q3-2020		11-Nov-19	18-Nov-19				12-Feb-20	11-Mar-20	1-Apr-20
4	CW-04	0.5	Power transmission infrastructure		FA	Q1-2023 to Q2-2024									
5	CW-05	0.9	ICT infrastructure		FA	Q1-2023 to Q2-2024									

No.	Package	Procurement Plan Amount($ millions)		Note	Type	Implementation Period	Current Status of Designs/Bid Documents	Submission Date to CDCL	Submission Date to ADB for Clearance	Advertize Bid	Bids Submitted	Submission Date of TDER to ADB for clearance	Submission Date for FBER to ADB for Clearance	Target date of Contract Award	Start Date
Consultants															
1	CS-01	5.7	Project Implementation Consultant	2	QCBS 90:10	Q3-2018 to Q2-2025			6-Dec-16	21-Feb-17	15-May-17				29-Oct-18
2	CS-02	0.25	Independent environmental monitoring expert		ICS	Q4-2018 to Q2-2025		16-Sep-18	23-Sep-18	13-01-19	21-01-19	31-01-19		4th April 2019	15-Jul-19
3	CS-03	0.1	Urban management advisor		ICS	Q2-2022 to Q1-2025		18-Mar-22	25-Mar-22	29-Apr-22		3-Jun-22			1-Jul-22
4	CS-04	0.1	Investment promotion advisor		ICS	Q4-2022 to Q1-2025		18-Jun-22	25-Jun-22	30-Jul-22		3-Sep-22			1-Oct-22
5	CS-05	1.3	Sustainable township management capacity development		QCBS 90:10	Q1-2023 to Q2-2025		6-May-22	23-May-22	10-Jul-22	4-Sep-22	2-Oct-22	30-Oct-22	4-Dec-22	1-Jan-23
6	CS-06	1.1	Investor promotion and transaction advisory services		QCBS 90:10	Q3-2023 to Q2-2025		3-Nov-22	10-Nov-22	7-Jan-23	4-Mar-23	1-Apr-23	29-Apr-23	3-Jun-23	1-Jul-23

achieved
pending
overdue
actual dates

	Indicative Durations						
ICB Works	14	35	42	28	35	21	28
ICB Works	7			86	28		
NCB Goods	7			72	28		
QCBS	7	58	56	28	28	35	28
ICS	7	35		35			28

Notes:
1 Includes cross drainage structures, land formation, and about $250K for supply and
2 to include prov sum packages for traffice management study ($100K), preparation of emergency management plan ($200K), and

Updated Contract award process till date

Contract	Bid prep.	Bid period	Bid evaluation	Award & Negotiation	LTP
CW-01 River Training	Q1 2017	Q1& Q2 2017	Q2 2017	Q2 2018	12 Sep. 2018
CW-02 Common urban infrastructure	Q2& Q3 2020	Q3 2020	Q4 2020 & Q1 2021	Q1 2021	Q2 2021
CW-03 Flood early warning system	Q1 2021				
CW-04 Power transmission infrastructure	Q3 2020				
CW-05 ICT/Telecom infrastructure	Q3 2020				
CS-01 PIC	Q1 2017	Q2 & Q3 2017	Q3 2017	Q3 2017	17 Sep. 2018
CS-02 Environment monitoring expert.	Q4 2018	Q1 2019	Q1 2019	Q2 2019	4th April 2019
Flood Management Consultancy	Included under PIC contract as per Contract Variation No. 2, signed July 2019				

Appendix 7: Updated Investment Cost

Project Investment Plan

(in $ million / Assumption Nu.67.97=$1.00 as of 31 Dec.2016)

Sources	Amount / Share	
	Amount	%
Asian Development Bank[a]	**53.00**	**84.1**
Ordinary capital resources (concessional loan)	28.74	45.6
Special Funds resources (ADF grant)	24.26	38.5
Government	**10.00**	**15.9**
	63.00	**100.0**

*Disaster Risk Reduction Fund will finance $6.07 million equivalent of the concessional OCR loan and $6.07 million of the ADF grant.

Source: ADB – PAM May 2018

Investment costs from Loan and Grant agreements (in $ million)

Investment costs	Total Amount (Taxes included)		ADB Loan		ADB Grant		Government*			
	Cur.	Amount	Amount	%	Amount	%	Costs	Taxes & duties	Total	%
Civil Works	USD	37.59	15.05	40	19.57	52	2.97		2.97	8
Consultancy Services (PIC)	USD	7.55	7.42	98				0.13	0.13	2
Recurrent Cost	USD	2.73					2.73		2.73	100
Contingencies	USD	14.07	6.27	45	4.69	33	3.11		3.11	22
Financial Charges	USD	1.05					1.05		1.05	100
	Total	**63.00**	**28.74**		**24.26**		**9.86**	**0.13**	**10**	**16**

Breakdown of Investment costs per Contracts and amounts used.

2nd Quarter: April 2020 – June 2020

Investment costs	Contracts Amount (Taxes included)		Certified up to February 2020		Certified this Month*(March 2019)		Certified this Month*(April 2020)		Certified this Month*(May 2020)**		Total Certified*	
	Cur;	Amount	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Civil Works Contracts (CW-01)	BTN	2,934,669,207	1,169,795,424	39.9	105,014,267	3.6	67,772,702	2.3	67,466,914	2.3	1,410,049,306.54	48.0
Consultancy Services (CS-01 PIC)	USD	4,138,144	794,516	19.2	54,515	1.3	46,599	1.1	46,759	1.1	942,389.24	22.8
	BTN	91,474,227	29,747,638	32.5	2,226,535	2.4	2,326,752	2.5	2,094,527	2.3	36,395,453.62	39.8
Independent Environment Expert	BTN	5,425,417.25	611,395.00	11.27							611,395.00	11.27

*Amount of works and services billed in the table above excludes taxes and advances. The data are from invoice of March 2020 to April 2020. May invoice was not disbursed by ADB during the report finalization.

* * The amount for May is currently under disbursement process

Appendix 8: Contract and disbursement S-Curve, ADB Loan and ADB Grant

Appendix 8.1 Status of Disbursement of Project Funds

Category	Description/ Name	Budget Allocation (mil. US$)	Contracts Awarded (mil. US$)	Uncontracted Balance (mil. US$)	Total Disbursed (mil. US$)	Undisbursed Amount (mil. US$)
		(a)	(b)	(c) = (a - b)	(d)	(e) = (a -d)
Loan	Civil Works	15.05	15.05	0	0	15.05
	Consulting services *(PIC)*	7.42	5.27	2.073	1.340	6.070
	Independent Environment Expert		0.077		0.008	
	Others	6.28	0	6.28	0	6.28
	Total	**28.74**	**20.397**	**8.353**	**1.348**	**27.40**
Grant	Civil Works (CW-01)	19.57	19.57	**0**	19.570	0.00
	Others	**4.69**	**4.69**	0	1.15	3.54
	Total	**24.26**	**24.26**	**-**	**20.72**	**3.54**
DHI	PMU and PIU Expenditures	1.67	N/A		0.230	1.440
	Training	0.21	0	0	0.043	0.167
	Operation and Maintenance	0.86	0	0	0.190	0.670
	Others**	7.25	0		0.625	6.625
	Subtotal	**10.00**			**1.088**	**8.912**

Note* -

The disbursed values (d) are as per CDCL Finance Division statement for PTDP for 2020 second Qtr.

An Equivalent amount at signing date CW-01 Contract, Nu.2,934,669,207=41.63million$ and PIC Contract, 5,44 million$ at 1US$ = 70.5 BTN

For CW-01 Contract amount, 41.63million$, remaining balance from Loan, 15.05, Grant, 19.57 and DHI, 2.97 is 4.04million$. If affected on an equal proportion of Civil Works items (Loan, 40%, Grant, 52% and Gov., 8%) to Physical Contingencies. Loan and Grant remaining amounts are insufficient.

For that matter the Additional financing is being processed with ADB.

Appendix 8.2 Schedule of contracts award and disbursement for Loan 3668-BHU

Exchange rate 1USD=70B

PTDP Loan: Contract Awards and Disbursement($Million)

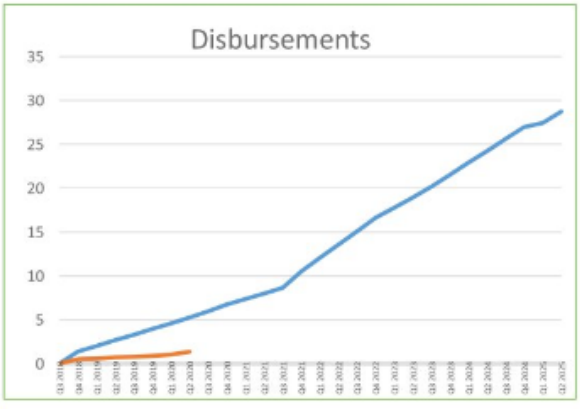
	Contract Awards($Million)					Disbursements($Million)				
Year	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
2018			14,04		14,04				1,38	1,38
2019					0	0,64	0,64	0,64	0,65	2,57
2020	0,2				0,2	0,64	0,64	0,74	0,75	2,77
2021		11,94			11,94	0,64	0,64	0,64	1,84	3,76
2022		0,1	0,1	1,28	1,48	1,54	1,54	1,54	1,54	6,16
2023		1,08			1,08	1,1	1,22	1,22	1,36	4,9
2024					0	1,36	1,36	1,36	1,36	5,44
2025					0	0,46	1,3			1,76
	Total contract award				28,74	Total Disbursements				28,74

Loan conracts Award ($million)

	Target		Actual	
Quarter	Amount	Cumul.	Amount	Cumul.
Q3 2018	14,04	14,04	23,01	23,01
Q4 2018	0	14,04	0	23,01
Q1 2019	0	14,04	0	23,01
Q2 2019	0	14,04	0,077	23,087
Q3 2019	0	14,04	0	23,087
Q4 2019	0	14,04	0	23,087
Q1 2020	0,2	14,24	0	23,087
Q2 2020	0	14,24	0	23,087
Q3 2020	0	14,24	0	23,087
Q4 2020	0	14,24	0	23,087
Q1 2021	0	14,24	0	23,087
Q2 2021	11,94	26,18	0	23,087
Q3 2021	0	26,18	0	23,087
Q4 2021	0	26,18	0	23,087
Q1 2022	0	26,18	0	23,087
Q2 2022	0,1	26,28	0	23,087
Q3 2022	0,1	26,38	0	23,087
Q4 2022	1,28	27,66	0	23,087
Q1 2023	0	27,66	0	23,087
Q2 2023	1,08	28,74	0	23,087
Q3 2023	0	28,74	0	23,087
Q4 2023	0	28,74	0	23,087
Q1 2024	0	28,74	0	23,087
Q2 2024	0	28,74	0	23,087
Q3 2024	0	28,74	0	23,087
Q4 2024	0	28,74	0	23,087
Q1 2025	0	28,74	0	23,087
Q2 2025	0	28,74	0	23,087

Loan Disbursements ($million)

	Loan		Actual	
	Quarter	Cumul.	Quarter	Cumul.
Q3 2018	0	0	0	0
Q4 2018	1,38	1,38	0,516	0,516
Q1 2019	0,64	2,02	0,066	0,582
Q2 2019	0,64	2,66	0,161	0,743
Q3 2019	0,64	3,3	0,045	0,788
Q4 2019	0,65	3,95	0,098	0,886
Q1 2020	0,64	4,59	0,155	1,041
Q2 2020	0,64	5,23	0,309	1,350
Q3 2020	0,74	5,97	0	1,350
Q4 2020	0,75	6,72	0	1,350
Q1 2021	0,64	7,36	0	1,350
Q2 2021	0,64	8	0	1,350
Q3 2021	0,64	8,64	0	1,350
Q4 2021	1,84	10,48	0	1,350
Q1 2022	1,54	12,02	0	1,350
Q2 2022	1,54	13,56	0	1,350
Q3 2022	1,54	15,1	0	1,350
Q4 2022	1,54	16,64	0	1,350
Q1 2023	1,1	17,74	0	1,350
Q2 2023	1,22	18,96	0	1,350
Q3 2023	1,22	20,18	0	1,350
Q4 2023	1,36	21,54	0	1,350
Q1 2024	1,36	22,9	0	1,350
Q2 2024	1,36	24,26	0	1,350
Q3 2024	1,36	25,62	0	1,350
Q4 2024	1,36	26,98	0	1,350
Q1 2025	0,46	27,44	0	1,350
Q2 2025	1,3	28,74	0	1,350



Appendix 8.3 Schedule of contracts award and disbursement for Grant 0573-BHU (as per PAM)

PTDP Grant: Contract Awards and Disbursement($Million)

Exchange rate 1USD=70BTN

	Contract Awards($Million)					Disbursements($Million)				
Year	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
2018			24,26		24,26				2,43	2,43
2019					0	1,37	1,37	1,37	1,37	5,46
2020					0	1,37	1,37	1,37	1,37	5,46
2021					0	1,37	1,37	1,37	1,37	5,46
2022					0	1,37	1,37	1,36	1,36	5,45
2023					0					0
2024					0					0
2025					0					0
	Total contract award				24,26	Total Disbursements				24,26

Grant conracts Award ($million)

	Target		Actual	
Quarter	Amount	Cumul.	Amount	Cumul.
Q3 2018	24,26	24,26	23,89	23,89
Q4 2018	0	24,26	0	23,89
Q1 2019	0	24,26	0	23,89
Q2 2019	0	24,26	0	23,89
Q3 2019	0	24,26	0	23,89
Q4 2019	0	24,26	0	23,89
Q1 2020	0	24,26	0	23,89
Q2 2020	0	24,26	0	23,89
Q3 2020	0	24,26	0	23,89
Q4 2020	0	24,26	0	23,89
Q1 2021	0	24,26	0	23,89
Q2 2021	0	24,26	0	23,89
Q3 2021	0	24,26	0	23,89
Q4 2021	0	24,26	0	23,89
Q1 2022	0	24,26	0	23,89
Q2 2022	0	24,26	0	23,89
Q3 2022	0	24,26	0	23,89
Q4 2022	0	24,26	0	23,89
Q1 2023	0	24,26	0	23,89
Q2 2023	0	24,26	0	23,89
Q3 2023	0	24,26	0	23,89
Q4 2023	0	24,26	0	23,89
Q1 2024	0	24,26	0	23,89
Q2 2024	0	24,26	0	23,89
Q3 2024	0	24,26	0	23,89
Q4 2024	0	24,26	0	23,89
Q1 2025	0	24,26	0	23,89
Q2 2025	0	24,26	0	23,89

Grant Disbursements ($million)

	Target		Actual	
Quarter	Amount	Cumul.	Quarter	Cumul.
Q3 2018	0	0	0	0
Q4 2018	2,43	2,43	2,07	2,07
Q1 2019	1,365	3,795	3,83	5,9
Q2 2019	1,365	5,16	2,33	8,23
Q3 2019	1,365	6,525	2,62	10,85
Q4 2019	1,365	7,89	3,14	13,99
Q1 2020	1,365	9,255	1,75	15,74
Q2 2020	1,365	10,62	4,97	20,71
Q3 2020	1,365	11,985	0	20,71
Q4 2020	1,365	13,35	0	20,71
Q1 2021	1,365	14,715	0	20,71
Q2 2021	1,365	16,08	0	20,71
Q3 2021	1,365	17,445	0	20,71
Q4 2021	1,365	18,81	0	20,71
Q1 2022	1,365	20,175	0	20,71
Q2 2022	1,365	21,54	0	20,71
Q3 2022	1,36	22,9	0	20,71
Q4 2022	1,36	24,26	0	20,71
Q1 2023	0	24,26	0	20,71
Q2 2023	0	24,26	0	20,71
Q3 2023	0	24,26	0	20,71
Q4 2023	0	24,26	0	20,71
Q1 2024	0	24,26	0	20,71
Q2 2024	0	24,26	0	20,71
Q3 2024	0	24,26	0	20,71
Q4 2024	0	24,26	0	20,71
Q1 2025	0	24,26	0	20,71
Q2 2025	0	24,26	0	20,71

Appendix 8.4: Reconciliation (by Withdrawal application) of projects records and ADB disbursement records (LFIS/GILFIS) for the fiscal year and cumulative

The first reconciliation report was submitted along with QPR no. 6 (Jan – Mar, 2020), and it is proposed to be submitted on annual basis. The final reconciliation report will be submitted in the last QPR of the project and/or with the project closure report.

The next reconciliation report will be submitted along with QPR 10 (Jan – Mar, 2021)

Appendix 8.5: Status of external audit observations – Cumulative from inception to end of reporting period

SN	Audit observation	external audit recommendation	Date of the recommendation	Planned action to address the recommendation	Responsibility	Current Status of the planned action (pending /resolved)
1	Excess Payment with Incorrect Application of Current Cost Index For Price Adjustment Nu.319,219,89	The justification furnished by the management is duly noted by the RRA. However, after further verification and recalculation based on the submission made by the management the RRA Team noted errors resulting into difference in computation of adjustment factors and consequently resulting into excess payment made to the contractor totaling to Nu.319,219,89.	April 2020	Project Management should adjust the excess payment of Nu.319,219.89 from the subsequent IPC of the contractor under intimation to the RAA.	Project Manager (PIU)& Project Director (PMU)	The excess payment is adjusted in the contractor's IPC no 20 RAA is accordingly informed. Acknowledgement from RAA yet to receive
2	Inadmissible Payment of BST from ADB instead from the equity portion (DHI) Nu.344,776.36	The justification furnished by the management that the inadmissible payment of BST amounting to Nu.344,766.36 was made due to oversight by the concerned official with inclusion of vehicles & bikes procurement as provisional sum under the PIC contract is duly noted.	April 2020	CDCL should strengthen control system to ensure that such inadmissible payment does not reoccur in the future and ensure that 98% of the consultancy cost is borne from the ADB Loan-3668/BHU while the remaining 2% of the consultancy and all tax components are covered from the equity contribution of DHI in line with contract Agreement.	Finance Manager (PMU), General Manager (FID)	The amount is adjusted from the PIC's invoice of March 2020 RAA is informed accordingly Acknowledgement yet to receive from RAA
3	Excess payment to consultant (Egis International) for Procurement of Bikes for PIU Nu.49,672.08	The justification with the additional supporting documents furnished by the management is duly noted by the RAA.As exhibited by the management a total of US$ 699.39 equivalent to Nu.49.672.077(71.022 *US$699.39) was paid in excess of the actual cost of the bikes to the consultant.	April 2020	The project management should adjust the above excess payment of US $699.399 equivalent to NU.49,672.077 from the subsequent IPCs of the consultant under intimation to the RAA. In addition, the CDCL should institute strong internal controls to ensure that no payments are made in excess of the actual cost of the items.	Project Manager (PIU)& Project Director (PMU)	The amount is adjusted from PIC's invoice of February 2020. RAA is informed accordingly Acknowledgement from RAA yet to receive
4	No price Adjustment done for Payments made to the Consultant in	The justification furnished by the management is in the process of price adjustment is	April 2020	The Project Management for both the current and future price adjustment should abide by clause 42.3 of the special conditions of the	Project Manager (PIU)& Project Director	The price adjustment is done and released to PIC RAA is informed

	Contravention to the contract Agreement	acknowledged. Once the price adjustments for the Egis international is processed and adjusted the RAA should be intimated accordingly.		Contract which stipulates that the Remuneration paid in foreign currency on the basis of the rates set forth in Appendix C shall be adjusted every 12 months(and the first time with effect for the remuneration earned in the 13th calendar month after the date of the contract effectiveness date).	(PMU)	accordingly Acknowledgement from RAA yet to receive
5	Over-Payment of Salary Arrears Nu.6915.00	The justification furnished by the management is duly noted by the RAA. However, as agreed, the project management should recover the excess payment of salary arrears amounting to Nu.6915.00 from the concerned official and deposit into the Audit Recoveries Account.	April 2020	The Management should ensure that such excess payment on account of salary arrears are not made in the future.	HR Officer, General Manager (Hr)	HR section adjusted the same. RAA acknowledged the adjustments
6	Direct award of work to M/s.Siacorian Construction works and supply Nu. 6,625,718.50	The justification furnished by the management for the direct award of above works totaling to Nu.6,625,718.50 with due approval from concerned authority is duly noted.	April 2020	The Project Management should strictly follow the relevant procurement methods for the given threshold levels as spelt out in the procurement Manual for works (2016) of CDCL (Clause 1.9.1) in line with PAM for PTDP.	Nil	For future reference. Observation only
7	Excess payment due to Application of Metal Iron Component instead of Mild Steel-Long Products for Index of steel Reinforcement Nu.8,371,941.55	The justification furnished by the management that the price index of metal iron was appropriately used as contractually agreed and any change in the source of index will invite contractual issues with the contractor is accepted by the RAA.	April 2020	The Project Management should validate the indices submitted by the contractor in the future contract packages.	Nil	For future reference. Observation only
8	Recruitment of Employees in Contravention to the CDCL's Service Rules.	The justification furnished by the management that the above stated section 4.17 of service rules(2016) applies to the external vacancies while positions in question were internal vacancies is duly noted.	April 2020	The CDCL should explicitly spell out in their service Manual on the internal recruitment and its requirements/Procedures.	Nil	For future reference. Observation only
9	Huge Budget Variances indicating Non-Implementation of Activities as Scheduled.	The justification furnished by the management explaining underutilization of loan budgets, amongst others, was primarily due to the no-implementation of work activities like BMBMS & FMC and given reasons is duly noted.	April 2020	The project management in order to cutail such budget variances, the project should implement & budgeted the work activities as accordingly.	Nil	For future reference. Observation only

Appendix 9: Environmental Monitoring Review for 5th Quarter (April – June 2020)

Introduction

This environmental aspect is prepared in compliance with the Contractors Environmental Management Plan (CEMP) for the Phuentsholing Township Development Project (PTDP). The project is financed with support from the Asian Development Bank (ADB) & Druk Holding and Investments (DHI). DHI is the Project Owner and the Executing Agency (EA) and Construction Development Corporation Limited (CDCL), is the Implementing Agency (IA). The Civil work contract of package CW-01 has been awarded to M/s AFCONS Infrastructural Limited, India. For supervising the Contractor's works, the CDCL has appointed M/s EGIS International as Engineer.

Purpose

Based on the Environmental monitoring carried out by PIC and PIU environment team and the Environmental monthly reports submitted by the contractor during the period April – June 2020, a summary of the environmental monitoring review has been prepared. The purpose of this section provides a review of the status of environmental safeguards and monitoring activity that is being adopted and supervised at the project site.

Project Update

Mobilization of manpower, equipment, construction of office and camp area, setup of basic amenities being completed, and the project is the first stage of construction activities for river training works, such as the start of construction diaphragm-wall, first outfalls construction and the start of backfilling construction

Works Progress

Works Progress are detailed in Chapter B3 "Implementation of physical works" of the present report.

Methodology for Environmental Monitoring

The monitoring methods used are visual inspection, informal interview of workers and residents and photographic documentation. Checklists for monitoring environmental compliances have also been developed jointly by PIC/PIU. The Environmental monitoring implementation plan had been developed as part of the CEMP and is shown as follows:

Environment Monitoring Implementation Plan					
Activities	**Locations**	**Numbers**	**Frequency**	**Remarks**	**Parameters**
Contractors Environmental Monthly Report	Zone A	12	12x /year	Contractor	As per the Outline
PIC monthly report	Zone A	12	12x /year	PIC	As per the Outline
Quarterly Report	Zone A	4	4x /year	PIC	As per the Outline
Semi-Annual Report	All PTDP Zones	2	2x /year	PIC	As per the Outline
Air Quality Monitoring	All PTDP Zones	6	2x /week	Based on site roster for each station	TSPM, PM2.5, PM10, SO2, NOX, CO
Noise	All PTDP Zones	6	Monthly	24 hours/ Work hours	Decibels- dB (A)
Noise	Zone A	3	Weekly	Instantaneous (1m, 3m, 5m)	Decibels- dB (A)
Water Quality	All PTDP	8	2x / year	April and October	pH, Color, Electrical

Monitoring	Zones				conductivity, TDS, Turbidity, Ammonia Nitrogen, Ca, Mg, Na, K, Salinity, COD, BOD, Cl, Phenol, Sulphates, Nitrate, fluoride, DO, SAR, TSS, cyanide, heavy metals, total coliform and faecal coliform
Water Quality Monitoring	Zone A	2	Monthly	By 15th of each month	
Ground Water Quality	Zone A	2	2x / year	April and October	
Soil Testing/ Ground Contamination Monitoring	Zone A	1	Monthly	By 15th of each month	Visual observation of contamination from oil, grease and other foreign materials.
Meteorology	Zone A	1	1 hourly	Monthly Weather Report. By 15th of the following month	Wind speed, Wind Direction, Temperature, Relative Humidity, Rainfall
Ecology	All PTDP Zones	All Zones	2x / year	Covering all seasons	Terrestrial flora and fauna, Zooplankton, Phytoplankton, Benthos & fishes
Biodiversity monitoring and benchmarking study (BMBMS)	All PTDP Zones	All	4x / year - for 3 years	January, April, July, and October. To be completed by External specialist. TOR prepared by PIC Environmental Specialist	Terrestrial flora and fauna, Zooplankton, Phytoplankton, Benthos & fishes

Environmental Monitoring schedule, activities and analysis

The comprehensive schedule of environmental monitoring activities carried out from April – June 2020 is enclosed here below:

Parameters	Location	Frequency	April 2020	May 2020	June 2020	Results / Comments
Contractors Environmental Monthly Report	Zone A	12x /year	07th May 2020 for April	04th June 2020 for May	03rd July 2020 for July	Submitted by Contractor
PIC monthly report	Zone A	12x /year	26th May 2020 for April	27th June 2020 for July	Submission not required	Submitted by PIC. Submission of Monthly report is not required during QPR submission for June month.
Quarterly Report	Zone A	4x /year	20th April 2020 for QPR N6 (1st January 2020 – 31st March 2020)	Ø	Ø	QPR N6 (1st January 2020 – 31st March 2020) Submitted by PIC
Semi-Annual Report	Zone A	2x /year	Ø	Ø	Ø	Submitted by PIC
Air quality	6 location	2x /week	01/04/2020-30/04/2020	01/05/2020-31/05/2020	01/06/2020-30/06/2020	Results have been submitted in the contractor's monthly report.
Noise – All PTDP zones	6	Once every month	01/04/2020-30/04/2020	01/05/2020-31/05/2020	01/06/2020-30/06/2020	Results have been submitted in the contractor's monthly report.

Surface Water quality – All PTDP zones	10	2x / year	Ø	Ø	Ø	SW01 – SW10 was conducted in March
Surface Water quality – Zone A	2	Monthly	21st April 2020	20th May 2020	20th June 2020	Results SW04 & SW05 has been submitted in the contractor's monthly report
Groundwater quality	Zone A	2x / year	Ø	20th May 2020	Ø	Ground Water Quality Test at Zone A was conducted along with Surface Water Quality Test on 20th May 2020
Soil Testing/ Ground Contamination	Zone A	Monthly	Ø	Ø	Ø	Visual observation has been submitted in the contractor's monthly report
Meteorology	Zone A	1 hourly	01/04/2020-30/04/2020	01/05/2020-31/05/2020	01/06/2020-30/06/2020	The result has been submitted as part of the contractor's monthly report
Ecology	All PTDP Zones	4x / year	16th April 2020	16th May 2020	17th June 2020	Terrestrial walkthrough
Biodiversity monitoring and benchmarking study (BMBMS)	All PTDP Zones	4x / year - for 3 years	Ø	Ø	Ø	Awaiting a decision from Client to start work.

Based on the above environmental monitoring carried out, an in-depth analysis has been provided as follows:

Air Quality[1]

The ambient air quality monitoring is being carried out along six locations of the PTDP project premises. To ensure that the project does not cause or contributes towards the already existing pollution in Phuentsholing town, parameters like TSPM, PM 10, PM 2.5, NOX, SO2 and CO are being carried out at each station twice every week. Depending on the results of the monthly tests, mitigation measure is being strictly implemented.

The PTDP project site is situated along the main Phuentsholing-Samtse highway. The average for all six locations were within the permissible limit for the months of April – June.

This is mainly because:

- It is monsoon season in Phuentsholing due to which the two has received a lot of rainfall in the last three months. This has caused the dust from the unpaved roads to settle.

[1]The air quality monitoring station (AA03 and AA06) has been shifted to NHDCL colony and near the Rigsar batching plant to assess impact on the project camp and lay down area at Zone A since Feburary 2019.

- The Rigsar and Yangkhil dredging has also stopped and has left from the project area, which has caused a reduction in movement of vehicles, loading and unloading activities which were all contributing towards the rise in pollution especially is AA06.
- With the outbreak of COVID-19 and the borders under lock down, there has been a drastic decrease in the movement of vehicles in Phuentsholing town and a drastic reduction in the project area. Other construction activities have also stopped for the time being due to lack of labour and construction materials.
- Most of the workshops which were situated along the Phuentsholing-Samtse highway have also been removed from the area, due to the development of the Phuentsholing Chamkuna Road. This has also helped in the reduction of movement and emission from vehicles and from the use of machines. The only drawback from all this is the number of trucks which has been parked along the Phuentsholing –Chamkuna Highway, which is becoming a hindrance to the daily commuters and the project..

Table 1: Average Data From April – June

Station Code		TSPM (µg/m3)	PM10 (µg/m3)	PM2.5 (µg/m3)	NO_X (µg/m3)	SO_2 (µg/m3)	CO (µg/m3)
	NEC Standard	200	100	-	80	80	2000
	IFC Standards	-	150	75	125	200	160
AA01 (Near B-Mobile Tower)	Maximum	79.84	43.09	21.88	BDL	BDL	BDL
	Minimum	4.63	2.49	1.20	BDL	BDL	BDL
	Average	21.99	11.49	6.65	BDL	BDL	BDL
AA02 (Near the STP plant)	Maximum	43.57	32.90	8.64	BDL	BDL	BDL
	Minimum	3.46	1.64	0.97	BDL	BDL	BDL
	Average	17.13	11.82	3.90	BDL	BDL	BDL
AA03 (NHDCL Colony)	Maximum	27.26	15.61	10.10	BDL	BDL	BDL
	Minimum	8.25	5.10	3.03	BDL	BDL	BDL
	Average	17.21	10.64	5.80	BDL	BDL	BDL
AA04 (Chamkuna Village)	Maximum	32.88	20.78	13.07	BDL	BDL	BDL
	Minimum	6.39	4.33	2.06	BDL	BDL	BDL
	Average	19.17	12.27	5.79	BDL	BDL	BDL
AA05 (Toorsa Tar Village)	Maximum	37.19	28.12	9.85	BDL	BDL	BDL
	Minimum	6.35	4.31	1.91	BDL	BDL	BDL
	Average	19.12	11.98	6.10	BDL	BDL	BDL
AA06 (Near Rigsar's Batching Plant)	Maximum	52.60	27.19	10.80	BDL	BDL	BDL
	Minimum	2.69	1.45	0.71	BDL	BDL	BDL
	Average	21.40	11.50	4.71	BDL	BDL	BDL

Mitigation Measures

Although difficult, the project in its capacity has been continuously monitoring and ensuring strict compliance on this issue, some of which is described as follows:

- Deployment of sprinkler truck and speed bumps initiated by the contractors. However, due to external activities simultaneously occurring within the project vicinity, the project corridors are covered in dust causing continuous exposure of duct to workers.

- Recommendation to provide N95 nasal masks or equivalent mask, and eye protection gear to all workers as a preventive measure.

- Site Inspectors to ensure that all workers use the provided gears while at the site.

- Construction materials at the site or being transported by truck are well covered with tarpaulin.

- Use of Bulkers in place of cement bags for Batching plant, which is currently being supplied by Dungsam Cement Corporation Limited (DCCL)

- Dust suppression measures such as temporary Speed bumps have been built along the project area and cautionary signage (speed limit) have been erected along the project area to reduce the speed of huge trucks and commuters.

- A traffic survey is also conducted every month by the contractors to study the number of times the project vehicles are using the highway in comparison to third-party vehicles. This study is conducted to ensure that project vehicles are not a major contributor to pollution.

- Contracts are also ensuring that all construction materials at the site are covered in tarpaulin.

Noise

Noise quality monitoring is conducted every day over a period of 24 hours by Ecolab in six locations. The test is conducted once during the day and the other at night time. Noise test is conducted to ensure that the sound generated is not only produced from project activities but from natural factors as well as other undertakings occurring in the vicinity. The test is also to ensure that the noise generated from the project area is temporary and will not have any lasting impact after its completion. Once the noise data has been gathered any mitigation measures which need to be taken care are immediately and strictly implemented.

For the month of April 2020 the noise level for NL06 during the day was above the permissible limits. The other stations were all within the permissible limits.

For the month of May 2020 the noise level for NL02, NL04, NL05 and NL06 during the day was recorded above the NEC permissible limits. The other stations were all within the permissible limits for the month.

For the month of June 2020 the noise level for all stations were within the NEC permissible limits.

The overall average for all stations are within the permissible limits except for NL06.

Apart from the PTDP project activities, there are other multiple external factors that are contributing towards the high level of noise pollution at the locations (NL02, NL04, NL05 & NL06):

- Firstly, locations NL02 is away from the main PTDP project site, but Grabbing work is currently ongoing at part 2 which is close to the B-mobile tower area for the month, which could have been a noise contributing factor. Additionally, location NL02 is located behind the truck parking area in town so noise from human interaction and trucks could also be another contributing factor.
- NL04 and NL05 which is also located away from the main project site, but along the station is the main Phuentsholing-Samtse highway, which is used by private vehicles for daily commute, PCR project vehicles and by boulder companies which are all contributors towards high noise level. Current PTDP work is ongoing at part 7 & 8 which is in closer proximity in comparison to other parts of the project. This could also be the cause for the rise in noise pollution.

- Some of the main contributors towards high noise level in NL06 is the collection of aggregate materials by Rigsar and Yangkhil, as their contract to dredge along the PTDP project is over, they have evacuated the space. Removal of their aggregates and materials from their site was probably one of the main factors for high level of noise in the location. They have yet to remove all their machines and equipment's from the project site.

- In the last three months Phuentsholing has received a lot of heavy rainfall, which was sometimes accompanied by thunderstorm, which are also possible factors contributing towards high level of noise.

- The noise generated during the testing are not permanent, and will not have any future impact.

Table 2: Noise data from April – June

Location		NL01	NL02	NL03	NL04	NL05	NL06
NEC	DAY	65					
	NIGHT	55					
IFC	DAY	55					
	NIGHT	45					
April	DAY	62.1	45.1	61.7	61.2	61.1	68.5
	NIGHT	42.5	31.8	39.9	38.1	44.3	43.8
May	DAY	60.1	69.1	63.1	73.2	65.6	71.3
	NIGHT	38.5	42.6	40.7	39.6	42.7	52.3
June	DAY	44.19	41.54	53.25	52.31	51.4	58.5
	NIGHT	43.13	37.72	50.25	49.15	40.9	44.7
AVERAGE	DAY	**55.46**	**51.91**	**59.37**	**62.24**	**59.37**	**66.10**
	NIGHT	**41.38**	**37.37**	**43.62**	**42.28**	**42.63**	**46.93**

Mitigation Measures

There are many external factors contributing to the rise in noise pollution which cannot be controlled, but sounds generated from the PTDP project activities are monitored and controlled. Contractors are advised to complete all work which requires the use of heavy machinery, which could generate loud noise during normal working hours. Contractors are also informed to ensure that all workers living in the camps do not

create too much noise which could disturb the neighboring households. All project drivers are also prohibited from unnecessarily honking in the vicinity.

All workers at the site have been informed and encouraged to wear suitable gears and wear their earplugs at all times or while functioning machines which generate loud noise.

Surface Water Quality

The surface water test is conducted to ensure that the project does not pollute and impact the Amochhu River. Ten locations (SW01-SW10) have been identified to conduct the water quality test. Out of the ten locations, a monthly test is conducted for SW04 & SW05 which are points right above and below the project camp area. This is to monitor and ensure that any camp or project activities are not contributing towards any form of pollution along that stretch of the river. Whereas a pre and post-monsoon water quality test encompassing SW01-SW10 are conducted every six months.

All parameters for the Average surface water test for SW04 & SW05 for the months from April – June 2020, are within the permissible limits except for TSS and turbidity in both the locations.

The level of DO (Dissolved Oxygen) is high in all locations, which is considered to be good especially for the aquatic life. DO in freshwater systems like the Omchhu and Amochhu River will vary depending on the season, location and water depth. Due to Phuentsholing town's geographical location at a lower altitude, the rivers are able to hold more dissolved oxygen in comparison to a higher altitude. In addition, cooler water can hold more dissolved oxygen than warm water.

High TSS and turbidity was indicated for both locations. One of the main causes for high TSS for the last three months is possibly due to the heavy rainfall that Phuentsholing has received. This has caused the river volume, velocity and current to increase all causing higher TSS and Turbidity. Other factors such as disposal of materials from construction sites along the Ammochhu and Omchhu, and industrial waste (from Karma steel) and settlements along the Omchhu are all factors contributing towards high TSS.

Table 3:Average Surface Water Quality Data For SW04 & SW05 from April – June 2020

Sl. no.	Parameter	Unit	Ambient Water Quality Standards as per NEC			IFC standards	Average	
			A (Very Good)	B (Good)	C (Moderate)		SW04	SW05
1	pH		6.5-8.5	6-9	6-9	6-9	7.74	7.86
2	Conductivity	µs/cm	800	1000	2000	-	171.53	149.87
3	Total Dissolved Solid	mg/L	-	-	-	-	98.30	88.77
4	Temperature		-	-	-	-	18.98	18.91
5	Biochemical Oxygen Demand (BOD) at 27˚ C	mg/L	2	5	50	30	9.36	5.68
6	Chemical Oxygen Demand (COD)	mg/l	-	-	-	125	27.14	18.58
7	TSS	mg/l	25	100	-	50	224.66	167.73
8	Dissolved oxygen	mg/l	6	4	-	-	0.08	0.06
9	Salinity	mg/l	-	-	-	-	10.80	10.90
10	Phenol	mg/l	0.001	0.002	-	-	BDL	BDL
11	Sulphate	mg/l	25	100	-	-	0.16	0.06
12	Nitrate	mg/l	10	50	-	-	2.21	2.23
13	Fluoride	mg/l	1	2	-	-	BDL	BDL
14	SAR	Miliequa./L	-	-	26	-	0.33	0.14
15	Ammonical Nitrogen	mg/l	-	-	-	-	0.31	0.01
16	Magnesium	mg/l	-	-	-	-	0.07	0.05
17	Sodium	mg/l	-	-	-	-	2.42	2.89
18	Potassium	mg/l	-	-	-	-	0.38	0.59
19	Chloride	mg/l				-	2.44	1.61

20	**Cyanide**	**mg/l**	0.05	0.05	-	-	BDL	BDL
21	**Lead**	**mg/l**	0.002	0.02	-	-	BDL	BDL
22	**Total Coliform**	**MPN/100ml**	50	5000	10000	400	9.67	13.67
23	**Fecal coliform**	**MPN/100ml**	20	2000	5000	-	6.00	10.33
24	**Odour**	**-**	unobjectionable	unobjectionable	-	-	unobjectionable	unobjectionable
25	**Mineral Oil**	**-**	No Film	No Film	-	-	No Film	No Film
26	**Iron***	**mg/l**	No permissible limit but recommended <0.3			-	0.08	0.06
27	**Manganese***	**mg/l**	0.4 maximum permissible limit			-	BDL	BDL
28	**Arsenic***	**mg/l**	Maximum permissible limit 0.01			-	BDL	BDL
29	**Color**	**PCU**	5	50	-	-	0.35	0.46
30	**Turbidity***	**NTU**	Maximum permission limit is 5			-	35.49	41.07

Mitigation Measures

Since the cause of high TSS and DO are due to external and natural factors, the PTDP can only ensure that our project and camp activities are not contributing towards the pollution. This can be achieved by ensuring that camp or project sites are:

- Properly collecting and disposing of all waste
- No dumping of construction materials along the riverbed or in the river
- Ensure that all construction materials are well covered
- Ensure that all restrooms in the project and campsites are well maintained so that workers are discouraged from defecating around the project vicinity or near the river
- Making sure to service the septic system at the project site and camps
- Landscaping the project office and camps with native plants

Ground water Monitoring

Groundwater testing is done every six months at two tube wells which are used for drinking and domestic use in the stockyard and the campsite to prevent any form of contamination due to oil and grease spillage.
For May, monitoring of groundwater contamination was conducted at two points GW01 (Camp area) and GW02 which was previously in the Office area, has now been shifted to Rigsar's campsite. This change in location was arranged during the ADB missions visit to the Rigsar campsite on November 1st. During the visit observations of spillage of grease and oil from the workshops was noted, and noticed a high chance of it seeping into the Amochhu River and the water being used by the workers. Keeping the risk factors to the workers and the aquatic life in the Amochhu in mind, the change in location was decided. The only parameters detected above the permissible limits was the Dissolved Oxygen (DO) for both GW01 and GW02.

High Dissolved Oxygen in both locations could be high because the samples were bottled from a booster pump pipeline, and oxygen from the air-water interface might have added to the oxygen level. Another factor is cooler water has a greater oxygen dissolving capacity, and given the current situation of change in climate and the constant rainfall, explains the higher oxygen level for May.
Iron are commonly found in water and are essential elements required in small amounts by all living organisms. The concentration of iron ground water can fluctuate seasonally and vary with the depth and location and the geology of an area. The most common sources of iron in groundwater are naturally occurring, for example from weathering of iron. Water with a high concentration of iron may cause the staining of plumbing fixtures. Iron can also collect and block pipes or fixtures and produce colour, taste and rust flakes in water. This can increase the growth of unwanted bacteria that form a slimy coating in water pipes.

Table 4 reflects the data for the Groundwater monitoring for May

SL. No.	Parameter	Unit	Ambient Water Quality Standards as per NEC			IFC standards	GW01	GW02
			A (Very Good)	B (Good)	C (Moderate)			
1	**pH**			6-9	6-9	6-9	7.28	7.43
2	**Electrical Conductivity**	**µs/cm**	800	1000	2000	-	127	181.3
3	**Total Dissolved Solute (TDS)**	**mg/l**	-	-	-	-	92	104
4	**Temperature**	**˚C**	-	-	-	30	20.62	20.14

SL. No.	Parameter	Unit	Ambient Water Quality Standards as per NEC			IFC standards	GW01	GW02
			A (Very Good)	B (Good)	C (Moderate)			
5	**Biochemical Oxygen Demand**	**mg/l**	2	5	50	30	0.097	0.085
6	**Chemical Oxygen Demand**	**mg/l**	-	-	-	125	0.209	0.503
7	**TSS**	**mg/l**	25	100	-	50	3.815	2.105
8	**Salinity**	**PSU**	-	-	-	-	0.02	0.04
9	**Dissolved Oxygen**	**mg/l**	6	4	-	-	10.97	9.62
10	**Phenol**	**mg/l**	0.001	0.002	-	-	BDL	BDL
11	**Sulphate**	**mg/l**	25	100	-	-	BDL	BDL
12	**Nitrate**	**mg/l**	10	50	-	-	0.017	0.031
13	**Fluoride**	**mg/l**	1.0	2.0	-	-	BDL	BDL
14	**SAR**	**mg/l**	-	-	26	-	0.045	0.037
15	**Ammonical Nitrogen**	**mg/l**	-	-	-	-	BDL	BDL
16	**Magnesium**	**mg/l**	-	-	-	-	BDL	BDL
17	**Sodium**	**mg/l**	-	-	-	-	1.073	1.401
18	**Potassium**	**mg/l**	-	-	-	-	0.058	0.073
19	**Chloride**	**mg/l**				-	BDL	BDL
20	**Cyanide**	**mg/l**	0.05	0.05	-	-	BDL	BDL
21	**Heavy Metal: Lead**	**mg/l**	0.002	0.02	-	-	BDL	BDL
22	**Total Coliform**	**MPN/100ml**	50	5000	10000	400	3	BDL
23	**Faecal Coliform**	**MPN/100ml**	20	2000	5000	-	BDL	BDL
24	**Iron***	**mg/l**	No permissible limit but recommended <0.3			-	0.709	0.924
25	**Manganese***	**mg/l**	0.4 maximum permissible limit			-	BDL	BDL
26	**Arsenic***	**mg/l**	Maximum permissible limit 0.01			-	BDL	BDL

Mitigation Measures

The cause of high DO and Iron are due to external and natural factors, the PTDP can only ensure that our project and camp activities are not contributing towards the pollution. This can be achieved by ensuring that camp or project sites are:

- Properly collecting and disposing of all waste
- All canisters containing oil and grease are well stored and covered
- Ensure that all construction materials are well covered
- Ensure that all restrooms in the project and campsites are well maintained so that workers are discouraged from defecating around the project vicinity or near the river
- Making sure to service the septic system at the project site and camps
- Landscaping the project office and camps with native plants
- Pitcher-type carbon filtration units can remove some forms of iron
- Water treatment with chlorine, ozone or by adding chemicals that cause the metals to form a solid that will settle or be filtered out

- Water treatment methods such as ion exchange, oxidizing filters, and reverse osmosis can also be used but these have variable effectiveness and may be expensive for small water systems or households

Meteorology

The metrological station was installed in March 2019. The average meteorological reading for the month of April – June are as follows:

Table 5: Average Meteorological data from April – June 2020

Parameters	Rainfall (mm)	Relative Humidity (g/m^3)	Temperature (Degree Celsius)	Wind Speed (km/h)
Average readings	25.16	69.88	26.7	2.28
Minimum	0	35.3	19.5	0
Maximum	128.6	96.4	36.1	19.7

Water regime

The first Water Regime monitoring was conducted on 1st April 2019. Since then, pictures of the river has been taken by the contractors twice every week. This monitoring is being conducted, so that the project can record the change in waterways and water level, and examine and analyse the information to ensure that the project will not be impacted.

Below are images of the changes seen during the last three months, April – June 2020. Due to the heavy rainfall, the river has become wider, the current is stronger, and has moved closer to the banks.

Water Level Monitoring

The first water level monitoring was conducted on 4th May 2019. Since then, the monitoring is carried out twice every week (Mondays and Saturdays) between part 5 & 6, where construction activities are currently ongoing. This monitoring is conducted to monitor the increase and decrease in the Amochhu water level. This monitoring is also another way to foresee any warning signs of flooding in the project area.

For the month of April Water level change of 0.092m was noted since the initial measurement which was conducted on the 4th April and the last test on the 30th April 2020.

For the month of May an average water level change of 0.262 m was noted since the initial measurement which was conducted on the 2nd and the last test conducted on 30th May 2020.

For the month of June water level change of 0.529 m was noted since the initial measurement which was conducted on the 1st and the last test conducted on 29th June 2020

Due to the monsoon season and heavy rainfall the river level has risen, it is becoming wider and getting closer to the river banks.

Ground contamination

To prevent ground contamination while using oil and grease, a tray container is used to prevent ground contamination in addition to the already cemented floor in the workshop. Although the contractors are taking measures to ensure no ground contamination occurs by using tray containers to store unsealed barrels of oil and grease, there were several spots around the project sites where there was leakage of oil and grease in the ground. This could be from vehicles, spillage during movement of barrels or from overflowing of the tray containers.

Several strategies for remediation are:

- The encapsulation process to ensure that contaminants do not spread any further.
- Thermal soil process is by baking the contaminated soil so contaminants evaporate and then disposing of the soil.
- Excavate soil and take it to a disposal site away from ready pathways for human or sensitive ecosystem contact.
- Containment of the soil contaminants such as capping or paving over in place

Solid Waste Management

To ensure the proper management of solid waste and understand the amount of waste generated by the PTDP project, the contractor has been asked to segregate, manage and keep a data log of waste generated. The contractor started submitting a data log of all the various solid waste generated at the project site from May 2020. The tables below reflect the three categories of waste generated from the project: Domestic waste, construction waste and liquid waste.

Domestic Waste

Domestic waste is the everyday trash generated from the office and labour camp spaces and the kitchen. Domestic waste is segregated into Degradable waste i.e. food waste and other relative biodegradable waste and non-degradable waste

Degradable Waste: Waste that decomposes naturally in the environment and are considered beneficial if discarded in a compost pit. Degradable/organic waste consist of vegetables, fruit peels, plants etc. waste

Non-biodegradable/Recyclable Waste: These are waste that cannot be broken down by natural organisms and cannot be decomposed by natural agents. They consist of waste like paper, plastic, cardboards and other miscellaneous office and camp waste.

Colour-coded bins have been installed in the project and campsites. Blue for degradable and Green for biodegradable waste. The Phuentsholing Thromde Municipality makes a bi-weekly or monthly trip to collect waste from the project site. A monthly record is maintained by the contractors to understand the amount of waste generated.

Table 6: Approximate Domestic Waste produced for May 2020

Months	Type of Waste Generated	Quantity (Approx)	Management Procedure
April	Degradable	1.67 MT	Collectively dumped in the Green color bins; when the bin is full, it is then taken by Phuentsholing Thromde and emptied in designated landfill site.
	Non- degradable	1.3 MT	Collectively dumped in the Blue color bins; when the bin is full, it is then taken by Phuentsholing Thromde and emptied in designated landfill site.
May	Degradable	1.7 MT	Collectively dumped in the Green color bins; when the bin is full, it is then taken by Phuentsholing Thromde and emptied in designated landfill site.
	Non- degradable	1.4 MT	Collectively dumped in the Blue color bins; when the bin is full, it is then taken by Phuentsholing Thromde and emptied in designated landfill site.
June	Degradable	1.5 MT	Collectively dumped in the Green color bins; when the bin is full, it is then taken by Phuentsholing Thromde and emptied in designated landfill site.
	Non- degradable	1.3 MT	Collectively dumped in the Blue color bins; when the bin is full, it is then taken by Phuentsholing Thromde and emptied in designated landfill site.

Construction Waste

These are the heterogeneous building waste materials which are produced from the PTDP construction activities. **Table 7** represents the quantity of construction waste produced for the month of May & June 2020. The three listed materials: Bentonite, cement waste and bags, and scarps, are the most commonly used materials and waste generated at the project site.

Table 7: Construction Waste produced for May – June 2020

Months	Type of Waste Generated	Quantity (approx)	Management Procedure
May	Bentonite	0 MT	Bentonite ($Al_2H_2Na_2O_{13}Si_4$) from the Diaphragm wall is used/ reused for maximum number of times (approx. 4-5 panels).
	Cement waste and cement bags	1.23 MT	Concrete waste is being dumped in designated pits strategically located at outfall 1, 2A, 4 and 7. If the concrete waste is in a large quantity then it is used in other construction actives. Cements bags are used as stop end supports in Diaphragm Wall
	Scraps	0.75 MT	Steel and Metal waste generated is being collected in respective scrap yards.
June	Bentonite	0 MT	Bentonite ($Al_2H_2Na_2O_{13}Si_4$) from the Diaphragm wall is used/ reused for maximum number of times (approx. 4-5 panels).
	Cement waste and cement bags	0.73 MT	Concrete waste is being dumped in designated pits strategically located at outfall 1, 2A, 4 and 7. If the concrete waste is in a large quantity then it is used in other construction actives. Cements bags are used as stop end supports in Diaphragm Wall
	Scraps	1.2 MT	Steel and Metal waste generated is being collected in respective scrap yards.

MT: Metric Tonne

MG: Million Gallons

Liquid Waste

Liquid Waste refers to Grey water from the kitchens and toilets. The respective Grey Water sources have proper drainage lines. The drainage line for the toilet block connects to the septic tank followed by a soak pit. The sludge from the septic tank is cleaned as per requirement.

Table 8: Liquid Waste produced for the months of May – June 2020

Month	Type of Waste Generated	Quantity (approx)	Management Procedure
May	Waste Water plus sludge	0.91 MG	The septic tanks are cleared in coordination with Phuentsholing Thromde as per requirement
June	Waste Water plus sludge	0.52 MG	The septic tanks are cleared in coordination with Phuentsholing Thromde as per requirement

Ecological Study

The PTDP is required to constantly monitor the aquatic and terrestrial ecology of the areas in and around the project site. The requirement is placed on the contractor, which has outsourced the job to Bhutan Ecolab consultants. The ecological study comprises of two components: Aquatic and Terrestrial survey. The study was proposed to be carried out every quarterly as per the CEMP. However, after the ADB

mission visit in May 2019, the study was agreed to be carried out bi-annually with each study covering all 4 seasons. The study is being conducted to comprehend the diversity of species (both aquatic and terrestrial) in the PTDP project area. For the months from October – December, an aquatic report was submitted in October and the second terrestrial report was submitted in January 2020.

Aquatic Survey: The objective of the survey is to assess and determine the diversity of fish species in the Amochhu basin. The third Aquatic survey (Second Pre-monsoon survey) (**Appendix III**) was conducted from 26th – 27th March 2020 for which approval was sought from the Department of Forest and Park Service. The details are as follows:

- The catch and release approach was adopted at all the sampling points. Electrofishing method was used to conduct this survey. Using Electro-Fisher device (DC 3 KW electro shocker. ELT 62-II D, Grassl, Germany) by pulsing (12 V) DC current for about 2 to 3 second into the water, which temporarily immobilized the fish. Dip net was used to catch the fishes. Fishes were placed in transparent photarium and photographed, and measured before releasing back into the river.
- Ten sites were located to conduct the fish sampling
- During the study, a total of 27 species of fishes were found which are reflected in tables 9, 10 & 11. The status of these species as per the Forest and Nature Conservation Regulations of Bhutan (FNCR) and the International Union for Conservation of Nature (IUCN) were identified in the EIA report as given below:

Table 9: List of fish species belonging to order Cypriniformis

Family Cyprinidae	IUCN Red List Status	Last Assessed as per IUCN
1. *Barilius barna*	Least Concern	19/03/2011
2. *Barilius bendelisis*	Least Concern	22/01/2010
3. *Barilius vagra*	Least Concern	22/01/2010
4. *Crossocheilus latius*	Least Concern	09/10/2009
5. *Garra annandalei*	Least Concern	09/10/2009
6. *Garra gotyla*	Least Concern	07/10/2009
7. *Neolissochilus hexagonolepis*	Near threaten	09/10/2009
8. *Neolissochilus dukai*	Data deficient	01/03/2010
9. *Pethia ticto*	Least Concern	22/03/2010
10. *Schizothorax progastus*	Least Concern	11/05/2010
11. *Schizothorax richardsonii*	Vulnerable	14/06/2010
12. *Tor putitora*	Endangered	
II). **Family Psilorhynchidae**		
13. Psilorhynchusbalitora	Least Concern (LC)	23/02/2010
III). **Family Balitoridae**		
14. Aborichthys sp.	Least Concern (LC)	Species not determined
IV). **Family Amblycipitidae**		
15. Amblyceps apangi	Least Concern	16/12/2009
16. Amblyceps cerinum	Least Concern	Not Assessed
V). **Family Sisoridae**		
17. Glyptothorax sp.	Least Concern (LC)	Species not determined

18. Glyptothorax panda	Least Concern (LC)	09/04/2010
VI). **Family Conitidae**		
19. *Lepidocephalichthys guntea*	Least Concern (LC)	Species not determined
VII). **Family Nemacheilidae**		
20. *Schistu rabeavani*	Least Concern (LC)	Species not determined
21. *Paracanthoscobitisab utwebi*	Least Concern	Not Assessed
22. *Schistu rareticulo fasciata*	Least Concern	Not Assessed

Table 10: List of fish species belonging to order *Perciformes*under respective to their Family

Name of the species	IUCN Red List Status	Last Assessed
VIII)Family *Channidae*		
23. *Channa punctatus*	Least Concern	Not Assessed
24. *Channa gachua*	Least Concern	Not Assessed
IX)Family*Badidae*		
25. *Badis badis*	Least Concern	10/03/2010

Table 11: List of fish species belonging to Order *Siluriformes*

Name of the species	IUCN Red List Status	Last Assessed
X)Family *Bagridae*		
26. *Olyralongicaudata*	Least Concern	Not Assessed
XI)Family *Sisoridae*		
27. *Pseudochenesis*	Least Concern	Not Assessed

Note: For the above tabulation (Table 9, 10 & 11) the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred.

Terrestrial Study: The objective of this study is to evaluate the diversity of terrestrial ecological components in the project area and the impacts. At the least, the purpose of the study is to assess the presence of species known to have existed before the project. On 16th January 2020, the fifth Terrestrial walkthrough was conducted by Ecolab with representative from PIU, PIC and AFCONs. On 16th February 2020, the sixth Terrestrial walkthrough was conducted by Ecolab with attendance from PIU, PIC and AFCONs. The Terrestrial survey report was submitted on March 2020. On 18th March 2020, the seventh Terrestrial walkthrough was conducted by Ecolab with attendance from PIU, PIC and AFCONs. The Terrestrial survey report was submitted on March 2020.

- A total of 24 floral (Tree) species which was also recorded in the past three reports. During the fourth survey, there was one new tree species *Ziziphus jujube (*jujube tree) was found.

- A total of 36 Floral (Herbs and Shrubs) species were recorded in all the four terrestrial surveys. During the fourth survey only three new Floral (Herbs and Shrubs) plants were recorded *Amaranthus retroflexus* (Red-wood pigweed), *Cryptolepsisi buchanani* (Wax leaved climber) and *Woodfordia fruticosa* (Fire flame bush).
- A Total of 7 species of climbers, creepers, vines and grass was recorded during all four surveys.

- The detailed report is attached as **Appendix IV.** Please refer to the report for detailed information.
- However, all species (Flora and Fauna) were recorded based on the survey questionnaires and the available secondary data, and no actual species were found during the survey.

Appendix 10: Health and safety monitoring for 5th Quarter (April – June 2020)

Sl. No.	Monitoring activities	Refer Legend for appropriate marking	
A. OVERALL CONSTRUCTION SITES			
1	Equipment/ Machines in Proper condition and safe	0	Yes. Vehicle certificates are updated and submitted to PIU & PIC
2	First Aid and Medical facilities	0	Yes. There is a infirmary at the project site and an ambulance is always available at the project site where work is ongoing.
3	Any Community / Social Concerns	0	No. So far no Grievance has been submitted
4	No encroachment into the farm land/ Settlement	0	No. The project activities are within the approved boundary
B. WORK STANDARDS			
1	General work area clean and tidy	0	Yes. Weekly house cleaning is conducted at the labor camp and daily cleaning at the project offices
2	Radio communications (emergency & general), call-up procedures adequate	0	Yes. Engineers and supervisors who are always at site are equipped with handsets or provided an allowance for cell phone usage.
3	Signage (PPE, safety & restricted access) visible, legible, good condition	0	Yes. Due to the weather condition the signage often discolor, but are replaced immediately.
4	Adequate signage at workshop yard entrance (e.g. Danger – Deep Excavation, Hazardous & Flammable materials, pressurized gasses, etc)	0	Yes. Signage is erected along the project and where activities are ongoing.
C. WORK ENVIRONMENT			
1	Stockpiles & materials stacked and maintained in a safe condition	0	Yes. The contractors have stocked up all their materials in a safe place, but often need to be reminded to cover materials after use.
2	Adequate lighting on-site, covered storage areas, vehicle maintenance pit	0	Yes. There is enough lighting especially during the night hours, and an in project workshop.
3	Segregated work areas and signage adequate (direction, warnings)	0	Yes. Signage and barricading tapes erected where necessary
4	Dust control measures adequate (water truck & sprinklers, if necessary)	0	Checklist of sprinkler

Sl. No.	Monitoring activities	Refer Legend for appropriate marking	
			truck deployment is maintained by the driver and submitted in the monthly EMR
D. HAZARDOUS SUBSTANCES OR DANGEROUS GOODS			
1	Fuel storage tank within sealed area & bonded (inside wall in case of a spill)	0	Sealed tanks are well stored. Contractors are encouraged to use tarpaulin and proper trays to store opened or empty fuel tanks.
2	Workers exposed to hazardous substances trained, adequate instruction provided	0	Yes. Workers are ensured that they wear their proper PPE while working and toolbox talks are provided every day.
3	Health/ Safety surveillance is undertaken where appropriate	0	Yes
4	Material safety data sheet available for hazardous substances		No hazardous substances required at the project site.
E. TOILETS AND KITCHEN			
1	Offices, Toilets, and washrooms maintained in a sanitary condition	0	All toilets are cleaned every morning
2	Toilets, Septic Tanks and Soak Pits being used properly and cleaned regularly	0	Yes. Septic tanks and soak pits at the workers camp and project office is being cleaned as and when required.
3	Properly labelled garbage bins installed around the kitchen & other areas and emptied regularly	0	Yes. Garbage bins are color coded.
4	Is the garbage in good management and disposed to the Thromde collection system?	0	Approx 4 Metric tons of waste was generated from April – June 2020
5	Soak pits are proper, covered, with no overflow?	0	No overflow
6	Kitchen sewage/waste disposed of in infiltration pits, with ACF, closed system?	0	Approx 4.8 Metric tons of degradable waste was generated from April – June 2020
7	Adequate water supply for washbasin & flush toilets?	0	Yes. Water tankers at project sites are refilled every morning or as and when needed.
F. DUST & SMOKE			
1	No visible dust clouds from excavation/levelling activity.	0	No. Dust clouds are formed due to the unpaved roads. Thus, sprinkler trucks are deployed every few hours or as and when required.
2	No burning of wastes	0	Not at the project site, but burning activity along the workshop lane across the project office and at NHDCL colony.
3	Waste bins facilities are available at the site	0	Blue- Degradable and Green- Non-degradable
G. GENERAL HEALTH AND SAFETY DURING CONSTRUCTION			
1	All workers trained in safety and hygiene at work? (Records)	0	Yes, and toolbox talks are

Sl. No.	Monitoring activities	Refer Legend for appropriate marking	
			provided everyday by AFCONs personnel
2	Site supervisors/ safety officer gives weekly toolbox talks to reinforce training to all the labourers?	0	Total of 48 toolbox talks conducted from April - June 2020
3	Equipment (backhoe etc.), machines, and vehicles are in proper condition with details of registration- emission certificate/ fitness certificates.	0	Yes. All vehicle documents are up to date. Emission test certificates are attached in **Appendix 14**
4	Workers equipped with PPE such as hard hats, eye and protection, ear protection, gloves, safety- shoes, and respirators	0	Contractors are handing out violation slips to workers who refuse to comply
5	High visibility clothing, including a vest to avoid “collision” in work area	0	Yes. All workers are provided with reflective jackets
6	Warning signs in place to shield workers from passing vehicle and segregation such as traffic cone and barrels	0	Yes. Barricading and sign boards are erected in required locations
7	Fencing/ Markers installed on all areas such as excavation, concreting, and side of temporary work/pits greater than 1m deep	0	Yes. Barraciation tapes are used at locations which could be of danger to the workers and passerby’s
8	Information for workers and adequate awareness working near construction vehicles & equipment the operator/ driver knows where the persons are located?	0	Yes. There is a safety inspector at each active site to monitor the ongoing activities.
9	Communicate with the driver using a radio, hand signals, etc.	0	Yes. Communication is either done via handsets, by whistling to gage the driver’s attention while working with loud machine, and signaling
10	Reversing siren, whistle, air-horn on vehicles or another device to warn fellow workers when they are in danger.	0	The alarm has been installed and a mock drill was conducted at the site on 27th June 2019.
11	Flagmen in place with flags and radio fully equipped and completed training?	0	Yes. They are kept at all ongoing work stations to help with the movement of heavy machinery and to aware other moving vehicles and individuals.
12	Proper Traffic Management Plan is available and adhered to	0	Yes. Traffic survey is being conducted.
13	Training and awareness meetings for HIV/AIDs (STI) including the prohibition of drugs/alcohol on construction site.	0	10th health briefing was conducted on 27th June 2020 by Phuentsholing General Hospital
14	First aid boxes are available and well stocked with bandages, antiseptic, etc. First Aid Register is available	0	Yes. All offices and work stations are provided with equipped first aid box.
15	Employee register with gender, nationality, skills maintained at the site	0	Yes, and a summary of the sheet is submitted with the monthly report.
16	Visitor Card, Register, Briefing, and Management System adopted	0	Yes. All visitors are to

Sl. No.	Monitoring activities	Refer Legend for appropriate marking	
			sign up at the entrance gate and scan their Druk trace app especially during the COVID pandemic
H. ACCOMMODATION REQUIREMENTS			
1	Domestic animals controlled to avoid nuisance?	0	Yes. All construction materials are barricaded and well covered
2	Information board to employees/method notification in the campsite?	0	Yes. Notification posters are posted along the entrance of the project and camp entrances

Legend: 0– No significant concern; √ Environmental or Safety concern, action to be taken. Non-Conformance or Photo was taken: yes ☑ no☒

Appendix 11: Compliance with Loan and Grant Covenants

Reference Section	Covenant	Status of Compliance
Project agreement CDCL		
Section 2.04	CDCL shall carry out the Project in accordance with plans, design standards, specifications, work schedules and construction methods acceptable to ADB. CDCL shall furnish, or cause to be furnished, to ADB, promptly after their preparation, such plans, design standards, specifications and work schedules, and any material modifications subsequently made therein, in such detail as ADB shall reasonably request.	Being complied with
Section 2.08.	(a) CDCL shall (i) provide its annual financial statements prepared in accordance with financing reporting standards acceptable to ADB; (ii) have its financial statements audited annually by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB, in accordance with auditing standards acceptable to ADB; (iii) as part of each such audit, have the auditors prepare the auditors' opinion(s) on the financial statements; and (iv) furnish to ADB, no later than 1 month after approval by the relevant authority, copies of such audited financial statements and auditors' opinion(s), all in the English language, and such other information concerning these documents and the audit thereof as ADB shall from time to time reasonably request.	Audited report form 2018 submitted to ADB on December, 2019. Audit report for 2019 submitted to ADB in June 2020.
Section 2.14.	CDCL shall promptly notify ADB of any proposal to amend, suspend or repeal any provision of its constitutional documents, which, if implemented, could adversely affect the carrying out of the Project or the operation of the Project facilities. CDCL shall afford ADB an adequate opportunity to comment on such a proposal prior to taking any affirmative action thereon.	Being complied with
Section 2.15.	Within 6 months after the Effectiveness Date, CDCL shall create a Project website to disclose information about various matters on the Project, including procurement. With regard to procurement, the website shall include information on the list of participating bidders, name of the winning bidder, basic details on bidding procedures adopted, amount of contract awarded, the list of goods/services procured, and the process for handling complaints related to contracts and procurement.	Being complied with
Project agreement DHI		
Section 2.04.	(a) DHI shall furnish to ADB all such reports and information as ADB shall reasonably request concerning (i) the Financings and the expenditure of the proceeds thereof; (ii) the items of expenditure financed out of such proceeds; (iii) the Project; (iv) the administration, operations and financial condition of DHI; and (v) any other matters relating to the purposes of the Financings. (b) Without limiting the generality of the foregoing, DHI shall furnish to ADB periodic reports on the execution of the Project and on the operation and management of the Project facilities. Such reports shall include updates on implementation of the SAP. Such reports shall be submitted in such form and in such detail and within such a period as ADB shall reasonably request, and shall indicate, among other things, progress made and problems encountered during the period under review, steps taken or proposed to be taken to remedy these problems, and proposed program of activities and expected progress during the following period.	Being complied with
Section 2.05	(a) DHI shall (i) maintain separate accounts and records for the Project; (ii) prepare annual financial statements for the Project in accordance with financial reporting standards acceptable to ADB; (iii) have such financial statements audited annually by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB, in accordance with auditing standards acceptable to ADB; (iv) as part of each such audit, have the auditors prepare a	Being complied with

	report, which includes the auditors' opinion(s) on the financial statements and the use of the Financings proceeds, and a management letter (which sets out the deficiencies in the internal control of the Project that were identified in the course of the audit, if any); and (v) furnish to ADB, no later than 6 months after the close of the fiscal year to which they relate, copies of such audited financial statements, audit report and management letter, all in the English language, and such other information concerning these documents and the audit thereof as ADB shall from time to time reasonably request. (b) ADB shall disclose the annual audited financial statements for the Project and the opinion of the auditors on the financial statements within 14 days of the date of ADB's confirmation of their acceptability by posting them on ADB's website. (c) In addition to annual audited financial statements referred to in section (a) hereinabove, DHI shall (i) provide its annual financial statements prepared in accordance with financing reporting standards acceptable to ADB; (ii) have its financial statements audited annually by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB, in accordance with auditing standards acceptable to ADB; (iii) as part of each such audit, have the auditors prepare the auditors' opinion(s) on the financial statements; and (iv) furnish to ADB, no later than 1 month after approval by the relevant authority, copies of such audited financial statements and auditors' opinion(s), all in the English language, and such other information concerning these documents and the audit thereof as ADB shall from time to time reasonably request. (d) DHI shall enable ADB, upon ADB's request, to discuss the financial statements for the Project and DHI and its financial affairs where they relate to the Project with the auditors appointed by DHI pursuant to subsections (a)(iii) and (c)(i) hereinabove, and shall authorize and require any representative of such auditors to participate in any such discussions requested by ADB. This is provided that such discussions shall be conducted only in the presence of an authorized officer of DHI unless DHI shall otherwise agree.	
Loan Agreement		
Section 3.01(b)	Loan to be applied exclusively to the financing of expenditures on the Project in accordance with the provisions of this Loan Agreement and the Project Agreement.	Being complied with
Section 3.03	The Borrower shall procure, or cause to be procured, the items of expenditure to be financed out of the proceeds of the Loan in accordance with the provisions of Schedule 4 to this Loan Agreement.	Being complied with
Section 4.03	The Borrower shall take all actions which shall be necessary on its part to enable DHI and CDCL to perform their respective obligations under the Project Agreements, and shall not take or permit any action which would interfere with the performance of such obligations.	Being complied with
Schedule 4, para. 2	Works shall be procured and Consulting Services shall be selected and engaged only on the basis of the procurement methods and the selection methods set forth below. These methods are subject to, among other things, the detailed arrangements and threshold values set forth in the Procurement Plan. The Borrower may only modify the procurement methods and the selection methods or threshold values with the prior agreement of ADB, and modifications must be set out in updates to the Procurement Plan.	Being complied with
Schedule 4, para. 5	DHI shall not award any Works contract which involves environmental impacts until: (a) The Borrower's National Environment Commission has granted the final approval of the EIA; and (b) DHI has incorporated the relevant provisions from the EMP into the Works contract.	Being complied with a) Being complied with, NEC approved the EIA b) C-EMP for CW-01 approved end January 2019.

Schedule 4, para. 10	Contracts procured under international competitive bidding procedures and contracts for Consulting Services shall be subject to prior review by ADB unless otherwise agreed between the Borrower and ADB and set forth in the Procurement Plan.	Being complied with
Schedule 5, para. 1	The Borrower, DHI and CDCL shall ensure that the Project is implemented in accordance with the detailed arrangements set forth in the PAM. Any subsequent change to the PAM shall become effective only after approval of such change by the Borrower and ADB. In the event of any discrepancy between the PAM and this Loan Agreement, the provisions of this Loan Agreement shall prevail.	Being complied with
Schedule 5, para. 2	The Borrower shall ensure that DHI and CDCL employ sufficient staff for the PMU and PIU for the duration of the project, with adequate and relevant expertise in the field of project management, financial management, engineering, procurement, and environmental and social safeguards implementation. The PMU Project Director and PIU Project Manager shall hold the position not less than the rank of Class 1 engineer, or equivalent, Officers, unless otherwise acceptable to ADB.	Being complied with
Schedule 5, para. 3	The Borrower, DHI and CDCL shall (a) ensure that the majority of counterpart staff assigned to the PMU and PIU are assigned to the Project on a full-time basis; and (b) undertake best efforts to ensure that they remain in their positions for a reasonable period of time, and that staff replacements do not unduly disrupt implementation of the Project. The Borrower, DHI and CDCL shall provide ADB reasonable opportunity to comment on any proposed appointment of persons to key positions in the PMU and PIU, including the Project Director for the PMU and the Project Directors for PIU.	Being complied with
Schedule 5, para. 4	The Borrower shall cause DHI and CDCL to give full, timely and efficient cooperation in issuing any licenses, permits or approvals required in connection with infrastructure work. The Borrower shall also ensure that Bhutan Power Corporation and Bhutan Telecom will provide the necessary connections in the developed areas.	Being complied with for CW-01 works To be complied with at end of the construction stage
Schedule 5, para. 5	Within 36 months of the Effective Date, the Borrower through DHI shall develop and finalize, and ensure approval by the relevant government agency and implementation of, the SAP, which shall include, among other matters: (i) the required legal, policy and operational frameworks for operation of the new township that will establish institutional arrangements for sustainable township management, including the required approval process, and the allocation of roles and responsibilities between the municipality and CDCL; (ii) the allocation of sufficient municipal and CDCL human resources; (iii) a plan on the development of the surrounding area adjacent to the newly developed township, including plans for raising grounds level for the protection for surface flooding; and (iv) a time-bound plan for the operation and maintenance of the newly developed township.	To be complied with for 2021 Q2
Schedule 5, para. 6 (Environment)	The Borrower shall ensure or cause DHI and CDCL to 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 Recipient relating to environment, health and safety; (b) the Environmental Safeguards; and (c) all measures and requirements set forth in the EIA and the EMP, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.	Being complied with
Schedule 5, paras. 7 and 8 (Land Acquisition and Involuntary Resettlement)	The Borrower shall ensure that all land and all rights-of-way required for the Project are made available to the Works contractor in accordance with the schedule agreed under the related Works contract. The Borrower shall ensure that the Project does not involve any involuntary resettlement impacts within the meaning of the SPS. In the event the Project involves any such impacts, the Borrower shall take all steps required to ensure that the Project complies with the applicable laws and regulations of the Borrower and with the SPS.	Being complied with
Schedule 5, para. 9 (Indigenous Peoples)	The Borrower shall ensure that the Project does not involve any indigenous peoples' impacts within the meaning of the SPS. In the event the Project involves any such impacts, the Borrower shall take all steps required to ensure that the Project complies with the applicable laws and regulations of the Borrower and with the SPS.	Being complied with
Schedule 5, para. 10	The Borrower shall ensure that the core labor standards and the Borrower's applicable laws and regulations are complied with during Project implementation. The Borrower 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)	Being complied with

	do not use child labor; (c) do not discriminate workers in respect of employment and occupation; (d) do not use forced labor; (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. The Borrower shall strictly monitor compliance with the requirements set forth above and provide ADB with regular reports.	
Schedule 5, para. 11	The Borrower shall ensure that the principles of gender equality aimed at increasing Project benefits and impact on women in the Project area are followed during the implementation of the Project. These include (a) equal pay to men and women for work of equal value; (b) enabling working conditions for women workers, and (c) taking necessary actions to encourage women living in the Project area to participate in the design and implementation of Project activities.	Being complied with
Schedule 5, para. 12	The Borrower shall make available, or cause DHI and CDCL to make available, necessary budgetary and human resources to fully implement the EMP.	Being complied with
Schedule 5, para. 13	The Borrower shall ensure, or cause DHI and CDCL to ensure, that all bidding documents and contracts for Works contain provisions that require contractors to: (a) comply with the measures relevant to the contractor set forth in the EIA and the EMP (to the extent they concern impacts or 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 with written notice of any unanticipated environmental risks or impacts that arise during construction, implementation or operation of the Project that was not considered in the EIA and the EMP; (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) Being complied with b) Being complied with c) Being complied with d) Being complied with e) to comply and end of works (2021 Q1)
Schedule 5, para. 14	The Borrower shall do the following: (a) submit bi-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 was not considered in the EIA and the EMP, 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 six months of the Effective Date, engage qualified and experienced external experts or qualified NGO[s] 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; and (d) report any actual or potential breach of compliance with the measures and requirements set forth in the EMP promptly after becoming aware of the breach.	a)Being complied with b) Being complied with c) Being complied with d) Being complied with
Schedule 5, para. 16	The Borrower through DHI will provide all counterpart funds, land and facilities required for timely and effective implementation of the Project, including without limitation, any funds required to (a) to meet any shortfall between cost and revenues for the operation and maintenance of the facilities developed under the Project, (b) to mitigate any unforeseen environmental and social impacts, and (c) to meet additional costs arising from design changes, price escalation in construction costs and/or unforeseen circumstances. The Borrower will make the resources thus required available on an annual basis for each fiscal year. In addition to the foregoing, the Borrower shall ensure that DHI and CDCL have sufficient funds to satisfy their liabilities arising from any Works and/or Consulting Services contract.	Being complied with
Schedule 5, para. 18	The Borrower, DHI and CDCL shall ensure that the anti-corruption provisions acceptable to ADB are included in all bidding documents and contracts, including provisions specifying the right of ADB to audit and examine the records and accounts of the executing and implementing agencies and all contractors, suppliers, consultants, and other service providers as they relate to the Project.	Complied with for CW-01. To comply with

		CW02, 03, 04 & 05
Schedule 5, para. 19	The Borrower shall develop and implement a program for regular and periodic maintenance of the facilities to be financed by the Project in accordance with international best practices acceptable to ADB, and make adequate resources available, through budgetary allocations or otherwise, for this purpose.	To be complied with one year before operating of every infrastructure
Grant Agreement		
Section 3.01	The Recipient shall make the proceeds of the Grant available to CDCL under the Subsidiary Financing Agreement upon terms and conditions satisfactory to ADB and shall ensure the smooth implementation of the Project and that such proceeds are applied to the financing of expenditures on the Project in accordance with the provisions of this Grant Agreement and the Project Agreements.	Being complied with
Section 4.02	The Recipient shall enable ADB's representatives to inspect the Project, the Goods and Works, and any relevant records and documents.	Being complied with

Appendix 12: Input Schedule for Independent Environmental Monitoring Expert

Provisional intermittent Input Schedule for Independent Environmental Monitoring Expert for the period July 2019 to July 2024

The schedule has been worked out as per contract agreement of 4 April 2019 signed between Construction Development Corporation Limited (CDCL) and Lam Dorji, Centre for Environment and Development

Intermittent input schedule

YEAR	MONTHS	
	January (Input days)	**July (Input days)**
2019	-	14 -31
2020	20 Jan – 3 Feb	15 -31
2021	15 - 31	15 -31
2022	15 - 31	15 -31
2023	15 - 31	15 -31
2024	15 - 31	15 -31

Total provision as per contract: 208 days

Provisional breakdown of each input:

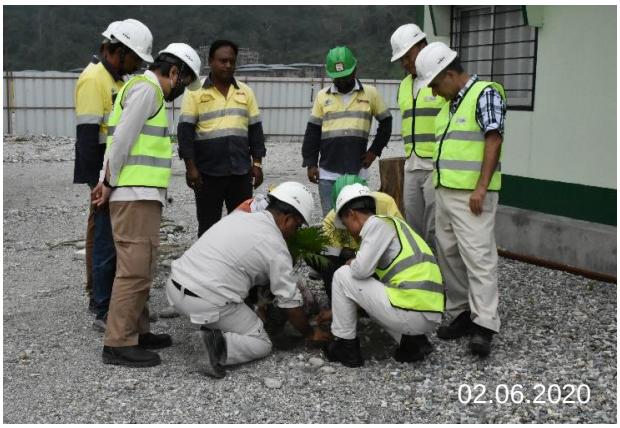
Activities	Estimated Input (days)
Beginning of input meeting with PIU, PIC and Environment Officer; preparation and confirmation of schedule with Environment Officer, PIU	1
Field visits, inspections and Consultation/ meetings with concerned officials and stakeholders	5
Review and comments on recent SEMR	2
Environmental Audit Report writing	5
End of input meeting with PIU	1
Final Report: Incorporation of comments and feedback on Final Draft	1

Appendix 13: Photographs album

13.1: Visitors and Particular Occasions

CEO(DHI), ACEO(CDCL) meeting and site visit

BPC official's visit for Power Infrastructure



Tree plantation at camp area during Social Forestry day at CDCL's camp

Appendix 13.2: Work progress

- **Site laboratory Test**

Initial and final setting time for cement

Silt content test

Coarse aggregate gradation test

Compressive strength test

MDD test at site lab

Fine aggregate gradation test

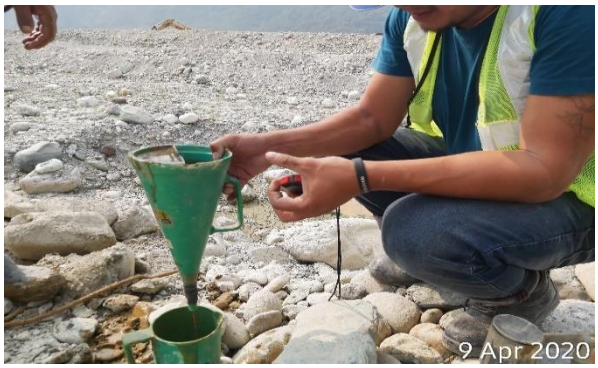
- **Protection Wall Works**

Diaphragm wall

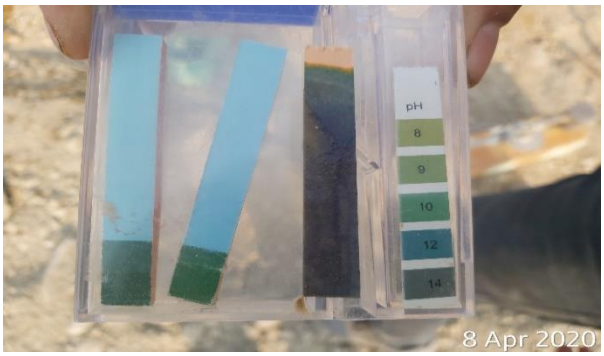
D-Wall excavation

Sounding check

Bentonite density test



Bentonite viscosity test



Bentonite pH test

Stop end installation

Rebar cage and weep holes installation

Slump test

Concreting the D-wall panel

Concreting the D-Wall panel

Concrete finish level check

Cast in Situ Wall

Formwork and reinforcement installations

Rebar and alignment check

Slump test for Cast in-situ wall

Concreting and compaction of concrete for cast-in situ

Concreted panel of cast in situ wall

- **Earth filling works**

Dumping and Spreading for earth filling work

Compacting the earth fill

OMC test after compaction

- **Dead man anchor block**


Rebar arrangement and alignment check

Slump test and concreting for dead man anchor blocks

- **Shear key at Retaining wall**


Rebar arrangement and alignment check

Slump test and concreting for Shear

- **Tree pit**


Excavations, installations and Alignment check

After installing Tree pit at Lower walkway

Appendix 13.3: Health Safety and Environment

HEALTH AND SAFETY


Safety walkthrough in the project working site


Training on: COVID-19, Emergency flood evacuation and Rigging and lifting safety

Health Awareness on Dengue

Health awareness on COVID-19, feminine hygiene and Dengue

- **Environment**

Terrestrial walkthrough at Zone B

Surface water testing and sampling

Terrestrial walkthrough

Surface water testing

Appendix 14

25/07/2020

List of vehicles on hire by CW01 with respect to the Emission Test Validity dates

Sl. No	Name/Type of Vehicle	Vehicle Number	Validity Date
1.	Bus	BP-2-A0062	13/09/2020
2.	Bus	BP-2-A0059	23/01/2021
3.	Transit Mixer	MH-40BG-8313	05/09/2020
4.	Transit Mixer	MH-40BG-8154	05/08/2020
5.	Transit Mixer	MH-40BG-7840	5/09/2020
6.	Transit Mixer	MH-46BB-2905	5/09/2020
7.	Transit Mixer	MH-40BL-4193	22/10/2020
8.	Transit Mixer	MH-40BL-2784	17/01/2021
9.	Camper	BP-2-B8531	17/01/2021
10.	Camper	BP-2-B8334	21/01/2021
11.	Ambulance	BP-1-3049	8/1/2021
12.	Scorpio	BP-2-B9820	28/10/2020
13.	Dumper	BP-2-A8653	17/09/2020

Bus – 01

13210

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YANGKI AUTOMOBILES

P. O. Box 384, Thimphu

VEHICLE EMISSION CERTIFICATE

Authorized by Royal Government of Bhutan vide letter No. RSTA/TM-12/2006/6598

Emission REF :		Tested Date :	[illegible]
Vehicle No. :	BP-2-A 0062	Registration Date :	[illegible]
Make :	Bharat	Type :	Bus
Frame No :		Engine # :	
		Fuel :	Diesel

Test Type	Test Value	Average Spread	RESULT		
	29-8				
CO	29.9 30.1	29.6	PASS	19/09/22	

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

For queries contact @ 00975-2-321184 (O), 17177177, 17666333
E-mail : yangkiauto@gmail.com

3

7/23/2020

Bus #2.

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EMISSION REF #	258043		Tested Date		23/07/2020
icle #	BP-2-A0059		Registration Date		11/12/2018
Make	Eicher		Type		Heavy Bus
Chassis #	MC2A5HRTOHF376049		Engine #		E414CDHF150304
			Fuel		Diesel
Test Type	Test Value	Average/Spread	Result	Validity	Remarks
T1	45.6	46.666666666666664	PASS	23/01/2021	
T2	48.5				
T3	47.9				
				Amount (Nu)	200.00

Maximum permissible HSU level = 75% for < 2005 Model & 70% for 2005 > Model

For queries contact @ 17666333 / 17177177, Email : yangkiauto@hotmail.com

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TRANSIT MIXER-01

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Emission REF :		Tested Date :	5/3/2020
Vehicle No. :	MH 40 AG 8513	Registration Date :	
Make :	heavy.	Type :	heavy.
Frame No :		Engine # :	
		Fuel :	Diesel

Test Type	Test Value	Average Spread	RESULT	Validity	REMARKS
CO	39.1 39.1	38.1	Pass	5/9/2020	YANGKI EMISSION

200

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

Light Vehicle Nu. 150/- ☐

Taxi Nu. 100/- ☐

Retest Fee Nu. 75/- ☐

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Emission REF :		Tested Date :	5/3/20
Vehicle No. :	MH - 40 - BG. 3154	Registration Date :	
Make :	heavy	Type :	heavy
Frame No :		Engine # :	
		Fuel :	Diesel

Test Type	Test Value	Average Spread	RESULT	Validity	REMARKS
CO	39.4 39.6	34.5	Pass	5/05/2020	GOVT. APPROVED AGENT YANGKI EMISSION PHUENTSHOLING

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

200

Light Vehicle Nu. 150/- ☐

Taxi Nu. 100/- ☐

Retest Fee Nu. 75/- ☐

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TRANSIT MIXER – 3

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Emission REF :		Tested Date :	5/3/20
Vehicle No. :	MH-40BG-7840	Registration Date :	
Make :	hemyo	Type :	hemy.
Frame No :		Engine # :	
		Fuel :	Dusel

Test Type	Test Value	Average Spread	RESULT	Validity	REMARKS
CO	40.1 4321	43.5	Pass	5/9/2020	YANGKI EMISSION CENTER PHUENTSHOLING

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

200.-

Light Vehicle Nu. 150/- ☐

Taxi Nu. 100/- ☐

Retest Fee Nu. 75/- ☐

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TRANSIT MIXER-04.

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Emission REF :		Tested Date :	5/9/20
Vehicle No. :		Registration Date :	
Make :	heavy.	Type :	heavy.
Frame No :		Engine # :	
		Fuel :	Diesel.

Test Type	Test Value	Average Spread	RESULT	Validity	REMARKS
CO	38.4	425.	Pass	5/9/2010.	

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

200.

Light Vehicle Nu. 150/- ☐
Taxi Nu. 100/- ☐
Retest Fee Nu. 75/- ☐

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TRANSIT MIXER-5

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Emission REF :		Tested Date :	22/04/2020
Vehicle No. :	MH-40-BL4193.	Registration Date :	—
Make :		Type :	—
Frame No :	MB1A2ACCLRSE7045	Engine # :	SBH695686.
		Fuel :	Diesel.

Test Type	Test Value	Average Spread	RESULT	Validity	GR. E. M. Authorized Agent YANGKI EMISSION CENTRE PHUENTSHOLING
CO	39.4 39.4	34.0.	Pass	22/10/2020	

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

200/-

Light Vehicle Nu. 150/- ☐

Taxi Nu. 100/- ☐

Retest Fee Nu. 75/- ☐

For queries contact @ 00975-2-321184 (O), 17177177, 17666333

E-mail : yangkiauto@gmail.com

TRANSIT MIXER - 6

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13330 YANGKI AUTOMOBILES

P. O. Box 384, Thimphu

VEHICLE EMISSION CERTIFICATE

Authorized by Royal Government of Bhutan vide letter No. RSTA/TM-12/2006/6568

Emission REF :		Tested Date :	17/07/2020
Vehicle No. :	MH-40 BL-2784	Registration Date :	
Make :	Transit mixer	Type :	heavy.
Frame No :	–	Engine # :	
		Fuel :	Diesel

Test Type	Test Value	Average Spread	RESULT	Validity	REMARKS
CO	39.4	40.5.	Pass	17/01/21	Govt. Authorized Agent YANGKI EMISSION CENTER PHUENTSHOLING

* Maximum permissible CO level = 4.5 < 2005 Model & 4.00 for 2005 > Model

200

Light Vehicle Nu. 150/- ☐

Taxi Nu. 100/- ☐

Retest Fee Nu. 75/- ☐

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1/17/2020

CAMPER-01

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P.O. Box 384

VEHICLE EMISSION CERTIFICATE

Authorized by Royal Government of Bhutan Vide letter No. RSTA/RS-12/2016/2231-36

EMISSION REF #	243033	Tested Date	17/01/2020
Vehicle #	BP-2-B853	Registration Date	06/10/2017
Make	Mahindra	Type	Light Vehicle
Chassis #	MA1RU4GHKH3B90909	Engine #	GHH4B60205
		Fuel	Diesel

Test Type	Test Value	Average/Spread	Result	Validity	Remarks
T1	97.7				
T2	35.3	56	PASS	17/01/2021	
T3	36.3				
				Amount (Nu)	150.00

Maximum permissible HSU level = 75% for < 2005 Model & 70% for 2005 > Model

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Authorized Signatory

Camper – 02

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VEHICLE EMISSION CERTIFICATE

ized by Royal Government of Bhutan Vide letter No. RSTA/RS-12/2016/2231-36

	BP-2-B8334	Tested Date	21/01/2020
	Mahindra	Registration Date	28/07/2017
	MA1RU4GHKG3G99050	Type	Light Vehicle
		Engine #	GHG4G57075
		Fuel	Diesel

Test Type	Test Value	Average/Spread	Result	Validity	Remarks
T1	27.1				
T2	15.9	18.666666666666668	PASS	21/01/2021	
T3	14.9				

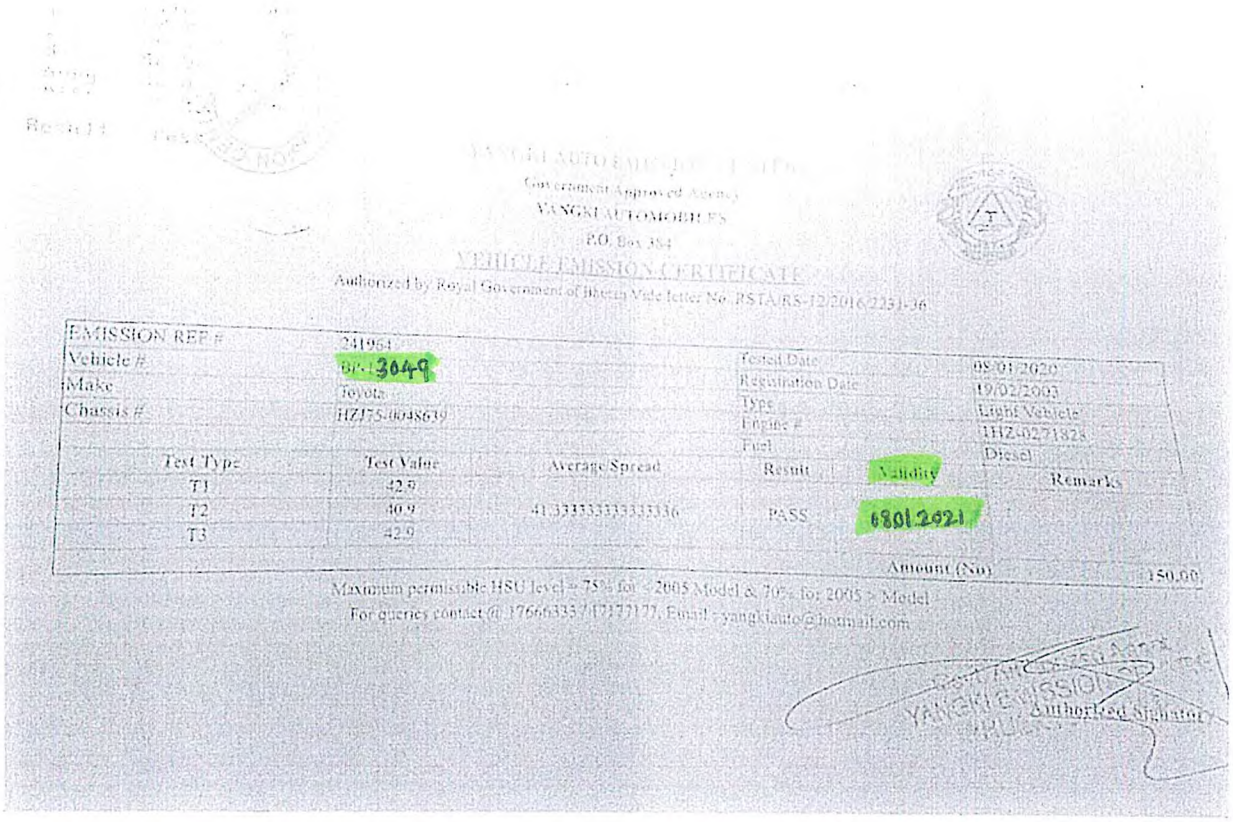
Amount (Nu): 150.00

Maximum permissible HSU level = 75% for < 2005 Model & 70% for 2005 > Model

For queries contact @ 17666333 / 17177177, Email : yangkiauto@hotmail.com

Govt. Authorized Agent
YANGKI EMISSION CENTRE
PHUENTSHOLING

Authorized Signatory



Government Approved Agency

YANGKI AUTOMOBILES

P.O. Box 384

VEHICLE EMISSION CERTIFICATE

Authorized by Royal Government of Tuvalu Vide letter No. PSTA/RS-12/2016/2231-36

EMISSION REF #	241964	Tested Date	09/01/2020
Vehicle #	Br- 3049	Registration Date	19/02/2003
Make	Toyota	Type	Light Vehicle
Chassis #	HZJ75-0048639	Engine #	1HZ-0271823
		Fuel	Diesel

Test Type	Test Value	Average Spread	Result	Validity	Remarks
T1	42.9				
T2	40.9	41.333333333333336	PASS	08/01/2021	
T3	42.9				

Amount (Ngn) 150.00

Maximum permissible HSU level = 75% for < 2005 Model & 70% for 2005 > Model

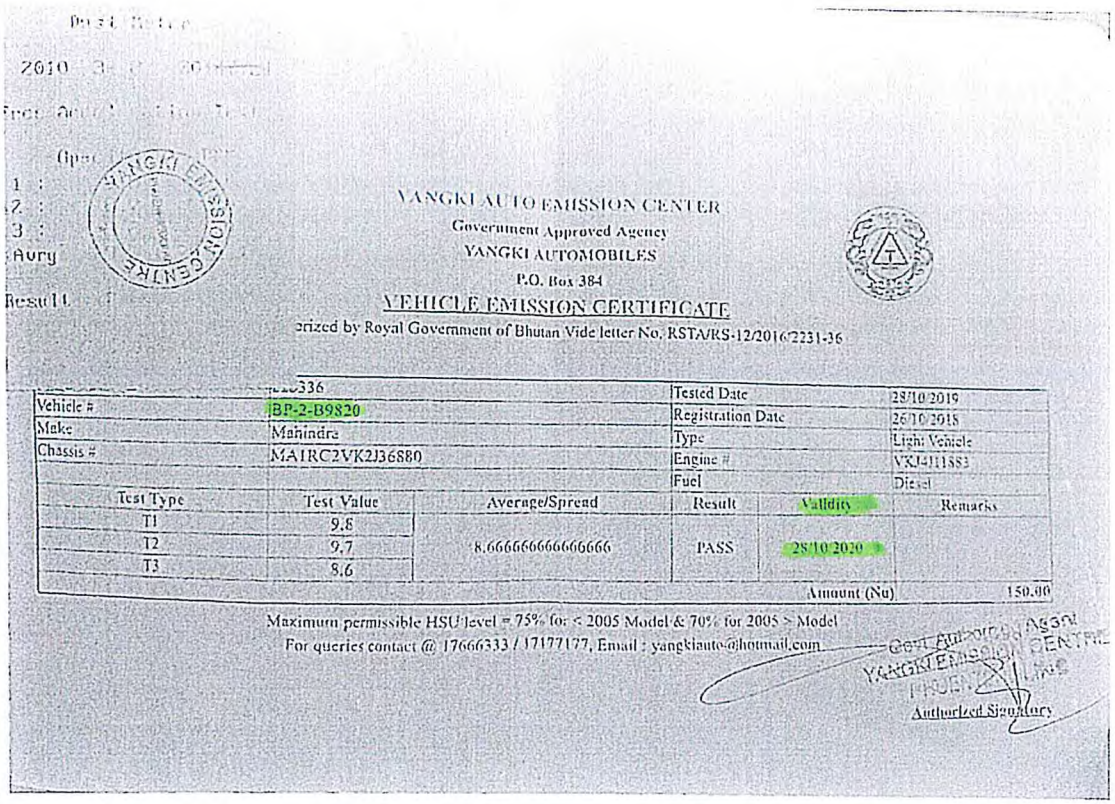
For queries contact @ 17666333 / 17177177, Email - yangklaute@hotmail.com

YANGKI AUTOMOBILES

Authorized Signature

Arm balance

Scorpio



YANGKI AUTO EMISSION CENTER

Government Approved Agency

YANGKI AUTOMOBILES

P.O. Box 384

VEHICLE EMISSION CERTIFICATE

orized by Royal Government of Bhutan Vide letter No. RSTA/RS-12/2016/2231-36

	336	Tested Date	28/10/2019
Vehicle #	BP-2-B9820	Registration Date	26/10/2015
Make	Mahindra	Type	Light Vehicle
Chassis #	MA1RC2VK2J36880	Engine #	VKJ4J11583
		Fuel	Diesel

Test Type	Test Value	Average/Spread	Result	Validity	Remarks
T1	9.8				
T2	9.7	8.666666666666666	PASS	28/10/2020	
T3	8.6				

Amount (Nu) 150.00

Maximum permissible HSU level = 75% for < 2005 Model & 70% for 2005 > Model

For queries contact @ 17666333 / 17177177, Email : yangkiauto@hotmail.com

YANGKI EMISSION CENTRE

Authorized Signatory

3/17/2020

Dumper - 01

YANGKI AUTO EMISSION CENTER

Government Approved Agency

YANGKI AUTOMOBILES

P.O. Box 384

VEHICLE EMISSION CERTIFICATE

Authorized by Royal Government of Bhutan Vide letter No. RSTA/RS-12/2016/2231-36

EMISSION REF #	250388		Tested Date		17/03/2020
Vehicle #	BP-2-A8653		Registration Date		25/02/2016
Make	Man Force Pvt. Ltd		Type		Heavy Vehicle
Chassis #	MBKMC5AR1GN016065		Engine #		6DGA21769
			Fuel		Diesel
Test Type	Test Value	Average/Spread	Result	Validity	Remarks
T1	32.6				
T2	25.8	26.333333333333332	PASS	17/09/2020	
T3	22.0				
			Amount (Nu)		200.00

Maximum permissible HSU level = 75% for < 2005 Model & 70% for 2005 > Model

For queries contact @ 17666333 / 17177177, Email : yangkiauto@hotmail.com

Authorized Signatory

Appendix 15

Updates on Risk Management Plan

The Risk Management Framework is well presented in the QPRs submitted earlier. The updates on the Risk Management Plans for this Quarter is presented hereunder:

Table 1: Impact & Risk Assessment

		Cost	Time	Quality	HSE Problem
Impact Threshold Definitions	**High**	>=10% of Budget	Delay 4 months or more	Failure of key elements which required rework	Death or hospitable more than 6 months
	Medium	2.0% to 10% of Budget	Delay 1 to 3 months	Moderate impact on Quality which required rework	Hospitable less than 6 months Medical aid Injury
	Low	< 2.0% of Budget	Delay 1 month or less	Minor impact on Quality, which just required repair	First aid injury

Table 2: Likelihood & Probability correspondence

	Probability		
Likelihood		**% on the overall Project Life**	**Possible frequency**
	High	More than 50%	Once every month or less
	Medium	25% to 50%	Less than once every month, more than once every semester
	Low	Less than 25%	Less than once every semester

Table 3: Risk Scoring Matrix

likelihood					
	High	3	4	5	6
	Medium	2	3	4	5
	Low	1	2	3	4
Unacceptable			1	2	3
Acceptable with mitigation			Low	Medium	High
Acceptable			Impact – Severity of Consequence		

Table 4: Project Risk Register

Project Phase	Risk Nº	Risk Description	Likelihood	Impact	Initial rating	Mitigation	Responsible	Final Ratin
1. Project Concept and Design	1.01	Change management Team	1	3		DHI and CDCL Board member nominator for long-term period	DHI	
	1.02	Internal conflict within Management Team	2	2		Autonomy of General Manager for executive team member designation	DHI	
	1.03	Weakness of design Team	2	3		Be strict on team composition and CV description, and deliverables quality	DHI	
	1.04	Non availability of data	2	3		Comprehensive TOR for surveys and strict quality control of surveyor by design team	PMU	
	1.05	Changes in the basic design	2	2		Request commitment of Agency to Project program	DHI	
	1.06	Incorrect cost estimate	2	3		Quantities to be audited and prices to be in accordance with market. External Audit of Design Team cost estimate.	PMU	
	1.07	Complexity of project architecture	1	2		No change to project arrangements. When possible split Project into basic and functional tranches. For utilities, as far as possible, transfer construction of tertiary equipment to buyers.	PMU	
2. Project Financing	2.01	Change of financial scheme, in particular for primary infrastructure funding	1	3		Have sufficient margin on project contingencies to absorb a limited financial drift and technical adaptation (especially impacting on primary infrastructures costs)	DHI	
	2.02	Developed land market week	2	3		Make pre-commitment with possible private buyers and/or with institutional investors.	DHI	
	2.03	Increase development costs	2	2		Have strict control on investment costs and avoiding any unnecessary additional costly expense.	DHI	
3. Procurement Plan	3.01	Packaging inconsistent with possible Contractors financial capacities	2	2		Prior packaging, make assessment of local and regional financial Contractors capacities	PMU	
	3.02	Packaging inconsistent with possible Contractors technical capacities	2	3		Prior packaging, make assessment of local and regional technical contractors capacities	PMU	

	3.03	Procurement schedule incoherent with anticipated Project implementation progress	1	3		Procurement plan to be adapted in case of revised schedule of progress of works, and services to be provided. Needs coordination for works packages progression.	PMU	
	3.04	Schedule of Procurement Plan have been affected by the COVID-19	2	2		Revised Schedule of Procurement Plan to be adapted in case of work progress and services to be provided with coordination for work packages progression.	PMU	
4. Recruitment of Consultants	4.01	Non-compliance with ADB guidelines	1	3		Regularly consult ADB on required Guidelines to be followed. Keep documents which received NOL	PMU	
	4.02	Delayed in shortlisting consultants	1	3		RFI be sufficiently detailed in order to be able to prepare proposal for shortlisting	PMU	
	4.03	Delayed preparation of terms of reference and request for proposals	1	2		Be pro-active in preparing biddings documents	PIU	
	4.04	Delayed evaluation of consultant proposals	2	2		Recruit adequate staff to prepare Bid Analysis Report	DHI PMU	
	4.05	Delayed award of consultant's contract	2	2		Avoid external interference in the selection process.	PMU	
5. Site Availability	5.01	Unavailability of land	2	3		Have margin to negotiate compensation to stake-holders, or split Project in additional execution tranche in order not to block overall implementation of Project	DHI	
	5.02	Obstruction to master plan, project program	1	3		Request upstream commitment of Local Authorities to Master plan, Project program and taking over core infrastructure	DHI	
	5.03	Change in local government policy	1	3		Be persuasive upon Project Goals and details, and make frequent update, permanently involve Authorities with Project progress.	PMU	
	5.04	Project limits not precisely determined	2	2		Coordination with others adjacent Projects, limits at each stage of Project (design, construction, marketing, maintenance) clearly defined	PIU	
	5.05	Conflict with riparian activities	2	2		Implement a communication plan, involving near-by stakeholders	PIU	
	5.06	Un-planned third party occupying the project site impacted by the COVID-19	1	2		The Government providing temporary accommodation for the people due to the lockdown of COVID-19 pandemic. To minimize the disturbance for the execution of project.	DHI	

6. Works or Goods Procurement	6.01	Bidding documents non-complying with ADB's standard bidding documents	1	3		Regularly consult ADB on required Guidelines to be followed. Follow documents which received NOL	PMU	
	6.02	Unclear, incorrect, and incomplete and/or restrictive	2	2		Checking carefully specifications produced by design team	PIU	
	6.03	Restrictive financial and technical evaluation	2	2		Criteria selection fitted for works, but as open as possible to widen competition	PMU	
	6.04	Unclear and/or incomplete special conditions of contracts	2	3		Be clear on fundamental PCC (securities, penalties, retention, price revision, works sectioning, safeguards, site availability,	PMU	
	6.05	Limited resources and capacities of the procurement unit/bid evaluation committee	1	2		PMU and PIU fully staffed	DHI	
	6.06	Bidders' complaints	2	2		Follow strictly bidding procedures and per bidding documents and ADB guidelines	PMU PIU	
	6.07	Constraints from local authorities	1	3		Be transparent about the Procurement process	PMU	
	6.08	Delays in award of Contracts	2	3		Detail comprehensively the various steps of procurement process, until Notice to Commence is given, and follow-up rigorously procedures.	PMU	
	6.09	Unsuccessful bidding	2	3		Have adequate budget for every procurement, have done proper analysis of possible interested Contractors capacity	DHI PMU	
7. Contract Execution and Implementation	7.01	Contract negotiations issues	2	3		Being clear on 6.2 and 6.4. Do not modify requested output and schedule	DHI	
	7.02	Delayed contract signing and effectiveness	2	3		Be strict on documentation and securities to be provided by Contractor prior negotiation. Confirm site availability, and financing plan completed and advance account in place	DHI PMU	
	7.03	Partial handing over of site	2	3		Be clear about time of Site constraints if any, and schedule of partial handing over	PMU PIU	

	7.04	Delayed Contractor's mobilization	3	6		Due to COVID-19, Royal Government of Bhutan to declare SOP	PIU PIC	
	7.05	Contractors un-respective of Conditions of Contract	3	2		To remain contractor about their obligation regularly in the letter	PIC	
	7.06	Lack of Contractor's cash flow	1	1		Pay contractor's IPC on time as per conditions of contract	PMU PIC	
	7.07	Subcontractors defaults	1	1		Be vigilient on sub-contractors capacity and qualifications	PMU PIC	
	7.08	Materials non-availability	2	1		Due to COVID-19 contractor to revise the procurement plan earlier, so that the materials can be delivered on time.	PIU PIC	
	7.09	Adverse climatic conditions	2	2		As per contractor confirmation during monsoon 33% only progress	PIU PIC	
	7.10	Increase of logistic costs	2	3		When unexpected costs are suffered by Contractor, accept Variation Order to compensate extra costs	PMU PIC	
	7.11	Change in ground conditions	1	1		When unexpected costs are suffered by contractor, accept variation order to compensate extra costs	PMU PIC	
	7.12	Poorly qualified manpower	1	1		Engineer to force contractor to fulfill his staffing obligation, and when necessary train or request personnel	PIC	
	7.13	Contractor Unsafe execution method	2	2		Engineer to force Contractor to prepare sound HSE management plan and to be firm on follow-up of plan	PIC	
	7.14	Contractors not-environmentally friendly	1	1		Engineer already remained contractor for sound CEMP	PIC	
	7.15	Third party disturbance	2	2		Housing will impact CW01 mainly. Good Coordination is required with all parties.	PIU PIC	
	7.16	Risk impact of uncontrolled third-party activity in the vicinity of project site	1	2		Continues coordination with the parties in a positive, constructive manner / approach to give clear understanding of the potential risk during monsoon season and be prepared with the required emergency evacuation plan as well as risk mitigation measures are in place	PIU PIC	

	7.17	Negative impact of COVID-19 on progress of PTDP	2	2		Clear strategy for transparent communication with all project stakeholders, focusing on the most critical materials, equipment, resources, preparing for legal and financial implications, working together to mitigate the unprecedented impact of the pandemic on progress of PTDP.	PMU PIU PIC	
8. Works Supervision	8.01	Inadequate supervision team composition and qualification	2	3		Prepare adequate TOR and adapt it for type of works and contract to be supervised, in terms of qualifications, number of staff and time input of supervision team	PMU	
	8.02	Weakness of supervision team individuals	2	2		Observe strict compliance with personnel qualification requirements for Key Staff.	PIU PIC	
	8.03	Insufficient Equipment and Logistic means of supervision team	2	2		Provide sufficient means for Supervision team to be able to perform his duties (Equipment, transport and office facilities).	PMU	
	8.04	Potential Conflict of interest	1	1		Barre any personnel having direct link with Government official or implementing agency and contractor who may be able to exercise any influence over the contract and project	PMU PIU PIC	
	8.05	Expert unavailable as per needs	2	2		Be firm on Construction Supervision Company to fulfill his commitment on quality and availability of personnel.	PIU	
9. Commissioning and handover	9.01	Unpreparedness of local authorities to be transferred the infrastructures	2	3		Make pre-agreement of transfer prior construction and at major step of construction, in particular completion testing, involve local authorities' representatives. Conduct Capacity development	PMU PIU	
	9.02	Unpreparedness of utilities companies	2	3		Make pre-agreement of transfer prior construction and at major step of construction, in particular completion testing, involve utilities companies' representatives	PMU PIU	
	9.03	Weakness of as-built documents	1	3		Engineer's to make clear on deliverable documentation and be strict on acceptance prior issuance of taking-over certificate	PIC	
	9.04	Delay due to lack of financial capacities of land buyers	2	2		Promote Project for capable Investors. When possible transfer risk to groups of buyers, and possibly adapt program. Make provision for financial charges, if marketing takes longer than expected.	DHI	

Appendix 16

Updated Project Performance Management Evaluation System

Table 1: Project Outcome and Outputs from Design and Monitoring Framework

	Indicator	Progress till 30 June 2020
Outcome Phuentsholing urban area protected from floods and expanded with improved amenities and services	By 2026: a. Phuentsholing and reclaimed land protected from 100-year flood events in the Amochhu River (2018 baseline: Phuentsholing is protected from mean annual floods) b. At least 10% of fully serviced plots tendered for development (2018 baseline: NA)	a. First assessment of the progress of achievement when cast-in-situ wall achieved. Q2/2020. b. Confirmation of tender scheduleQ2/2024
Outputs 1. Flood and erosion protection measures installed	By 2025: 1a. 4.7 km of climate and erosion-resilient river walls constructed to protect against 100-year probable flood (2018 baseline: 0) 1b. At least 66 ha of land reclaimed (2018 baseline: 0) 1c. CW03- A flood early warning system (FEWS) and community-based flood management plan established and operational (2018 baseline: NA)	1a. Construction of river protection started in Jan 2019 and 86% achieved. 1b. Construction of backfilling started in Feb 2019 and 39.8% achieved. Land reclaimed when walkways finished. 1c. CW03-Not yet started. FEWS to be installed from Q2/2020 to Q4/2021
2. Municipal infrastructure constructed	2a. 10 km of roads with footpaths, landscaping, and streetlights planned with at least 30% female participation (2018 baseline: 0) 2b. Water treatment plant with a capacity of 4 MLD constructed (2018 baseline: none) 2c. 12 km of new primary and secondary water mains constructed (2018 baseline: 0) 2d. 9 km of new sewer mains and 9 km of new storm drains constructed (2018 baseline: 0) 2e. A sewerage treatment plant with a capacity of 3 MLD constructed (2018 baseline: 0) 2f. A resource recovery system for solid waste management installed (2018 baseline: 0) 2g. A 630 KVA grid substation constructed (2018 baseline: 0) 2h. 16 circuit-km of 415-volt power distribution lines installed (2018 baseline: 0) 2i. 11 circuit-km of telecommunication transmission cables installed (2018 baseline: 0)	To be started with CW-02, CW-04 & CW-05. 2a. To be assessed from Q3/2021 2b. To be assessed from Q3/2021 2c. To be assessed from Q3/2021 2d. To be assessed from Q3/2021 2e. To be assessed from Q3/2021 2f. To be assessed from Q3/2021 2g. To be assessed from Q2/2022 2h. To be assessed from Q2/2022 2i. To be assessed from Q2/2022
3. Township management systems installed	3a. At least 80% of township management staff reported improved knowledge of modern urban management (2018 baseline: NA) 3b. An asset management system established with 100% of project infrastructure and facilities geocoded in a database (2018 baseline: NA) 3c. At least 10 potential investors attended investor outreach campaigns (2018 baseline: NA)	3a. First assessment in the Year 2024 3b. To be assessed from Q2/2022 3a. To be assessed on Q3/2024

Table 2: PTDP Proposal for Project Performance Indicators

Components / Outputs	Target quantity / Value (US$)	Proposed Weight
Implementing agency capacity		**5.0%**
Establish PMU/PIU		*3.0%*
PMU/PIU Staff training and development		*2.0%*
Site possession		**5.0%**
Site possession legal documents		*4.0%*
Third parties activities cessation		*1.0%*
Output 1 Flood protection measures installed		**40.0%**
1a. River training works	*1090.26 million*	*20.0%*
1b. Embankment Works	*694.13 million*	*8.0%*
1c. General Earth Filling	*429.53 million*	*4.0%*
1d. Promenade Finishing	*149.72 million*	*2.0%*
1e. Irrigation and Landscape Works	*70.66 million*	*1.0%*
1f. Flood early warning system installed	*xxx$*	*5.0%*
Output 2 Municipal infrastructure installed		**40.0%**
2a. 10 km of urban roads built	*10,000m*	*10.0%*
2b. Water treatment plant constructed	*xxx$*	*5.0%*
2c. 12km of water distribution pipes constructed	*12,000m*	*5.0%*
2d. 9km of sewage pipes and 9 km of storm drains constructed	*18,000m*	*5.0%*
2e. Sewage treatment plant constructed	*xxx$*	*5.0%*
2f. System for solid waste management installed	*xxx$*	*2.0%*
2g. 630kva grid substation constructed	*xxx$*	*2.0%*
2h. 16km of HV power distribution lines installed	*16,000m*	*3.0%*
2i. 11 km of telecom cables installed	*11,000m*	*3.0%*
Output 3 Township management systems installed		**10.0%**
3a. Township management staff improved knowledge of urban management	*80% of staff*	*5.0%*
3b. Asset management system installed	*100% of infra*	*4.0%*
3c. Potential investors to attend investor outreach campaign	*10 investors*	*1.0%*
Overall Project Progress		**100.00%**

Table 3: PTDP overall progress as of Q7 2020, compared to scheduled

Components / Outputs	Target quantity / Value (US$)	Proposed Weight	Schedule Progress (Qty)	Scheduled Progress (%)	Weighted Scheduled Progress	Actual Progress (Qty)	Actual Progress (%)	Weighted Actual Progress
Implementing agency capacity		**5.00%**			**3.00%**			**3.20%**
Establish PMU/PIU		3.00%	3.00%	100%	3.00%		100%	3.00%
PMU/PIU Staff training and development		2.00%	0.00%	0.04%	0.10%		0.04%	0.10%
Site possession		**5.00%**			**5.00%**			**4.70%**
Site possession legal documents		4.00%	4.00%	100%	4.00%		100%	4.00%
Third parties activities cessation		1.00%	1.00%	100%	1.00%		70%	0.70%
Output 1 Flood protection measures installed		**40.00%**			**31.80%**			**17.09%**
1a. River training works	1,090.26	20.00%	1090.26	100.0%	20.00%	845.18	77.52%	15.50%
1b. Embankment Works	694.13	*8.00%*	590.60	85.1%	6.81%	33.86	4.88%	0.33%
1c. General Earth Filling	429.53	*4.00%*	383.02	89.2%	3.57%	130.48	30.38%	1.08%
1d. Promenade Finishing	149.72	*2.00%*	79.97	53.4%	1.07%	24.35	16.26%	0.17%
1e. Irrigation and Landscape Works	70.66	*1.00%*	25.30	35.8%	0.36%	0.00	0.00%	0.00%
1f. Flood early warning system installed	xxx$	*5.00%*	0	0.00%	0.00%	0.00	0.00%	0.00%
Output 2 Municipal infrastructure installed		**40.00%**			**0.00%**			**0.00%**
2a. 10 km of urban roads built	10,000m	10.00%	0m	0.00%	0.00%	0m	0.00%	0.00%
2b. Water treatment plant constructed	xxx$	5.00%	0$	0.00%	0.00%	0$	0.00%	0.00%
2c. 12km of water distribution pipes constructed	12,000m	5.00%	0m	0.00%	0.00%	0m	0.00%	0.00%
2d. 9km of sewage pipes and 9 km of storm drains constructed	18,000m	5.00%	0m	0.00%	0.00%	0m	0.00%	0.00%
2e. Sewage treatment plant constructed	xxx$	5.00%	0$	0.00%	0.00%	0$	0.00%	0.00%
2f. System for solid waste management installed	xxx$	2.00%	0$	0.00%	0.00%	0$	0.00%	0.00%
2g. 630kva grid substation constructed	xxx$	2.00%	0$	0.00%	0.00%	0$	0.00%	0.00%
2h. 16km of HV power distribution lines	16,000m	3.00%	0m	0.00%	0.00%	0m	0.00%	0.00%

installed								
2i. 11 km of telecom cables installed	11,000m	3.00%	0m	0.00%	0.00%	0m	0.00%	0.00%
Output 3 Township management systems installed		**10.00%**			**0.00%**			**0.00%**
3a. Township management staff improved knowledge of urban management	80% of staff	5.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3b. Asset management system installed	100% of infra	4.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3c. Potential investors to attend investor outreach campaign	10 investors	1.00%	0	0.00%	0.00%	0	0.00%	0.00%
Overall Project Progress		**100.00%**	**100.00%**		**19.06%**			**19.06%**

Appendix 17

INSTRUMEX

An ISO 9001-2015 Certified Company

CALIBRATION CERTIFICATE FOR MULTIGAS DETECTOR

Certificate No: GD-102/19-20/641

Name of the Client	Calibrated on:	Calibration Due on:	Environmental Details:
M/s. Bhutan Ecolab	28.02.2020	27.02.2021	Temperature : (25 ± 2)°C Relative Humidity : (68±10) %

Details of Device Under Calibration [DUT]:	Details of Standard Instrument used for calibration [STD]:
Description : Multi Gas Detector Model No. : GD-102 Range : CO: 0 to 500ppm SO2 : 0 to 500ppm NO2: 0 to 500ppm Serial No. : 01/2019H/061	Description : Reference Gases of CO, SO2 and NO2 : Gas Flow meter

Calibration Results:

Sr. #	Sample Gas	Standard Value (ppm)	Value on Device Under Test (ppm)	% Error	Remarks
1	CO	5	5.3	13	Acceptable
		20	23	13	Acceptable
		50	48	04	Acceptable
		100	96	04	Acceptable
		200	206	02	Acceptable
		500	493	01	Acceptable
2	SO_2	5	4.8	04	Acceptable
		20	18	11	Acceptable
		50	45	10	Acceptable
		100	106	06	Acceptable
		200	190	05	Acceptable
		500	491	02	Acceptable
3	NO_2	5	4.7	06	Acceptable
		20	21	05	Acceptable
		50	55	10	Acceptable
		100	108	08	Acceptable
		200	212	06	Acceptable
		500	513	02	Acceptable

Remarks:

- Calibration Method : Passing Standard Gas mixture over the instrument and standard device.
- The average percentage error was found to be within the acceptable limits.
- Results reported are valid at the time of and under the stated conditions of measurement

Calibrated by:	
Naem K.	
Certificate Prepared by:	
Rishabh K.	
Certificate Checked by:	
Radheshyam K.	

Factory Certificate Stamp

Envirotech Instruments Pvt. Ltd.

ISO 9001:2015 certified company

Manufacturers of Air Quality Monitoring Instruments

Regd. Office & Works: A-271, Okhla Industrial Area, Phase-I, New Delhi-110020, India Tel: 26814139 / 26813887
Fax: 91 11 26811833 E-mail : sales@envirotechindia.com Website : www.envirotechindia.com CIN: U74899DL1983PTC016927

M/s Bhutan Eco –Lab Services
Pekarzhing (Toribari) Phuentssholing, Chhukha
Bhutan

Certificate No.: EIPL/SLM/2019-20/86

Date of calibration: 08/12/2019

CALIBRATION CERTIFICATE

This is to certify that Sound Level Meter Envirotech SLM -100 (Sl. No. 347-DTA-2017) have been calibrated by EIPL. Details of Reference Equipment used for calibration.

Traceability Statement:	All the following Reference Equipments used to calibrate Sampler, are traceable to National Standards.		
Calibrator Name	**Make**	**Model & S.No.**	**Certificate Report No.**
Sound Level Calibrator Calibrated at FCRI, Palakkad, Kerala	Metravi	SC-05 150610293	FCRI/EQL/18-19/675 Dt. 12/12/2018

Recalibration is due on 07/12/2020 or after a major repair/overhaul.

For Envirotech Instruments Pvt. Ltd

(Authorized Signatory)

Envirotech Instruments Pvt. Ltd.,

M/s Bhutan Eco –Lab Services
Pekarzhing (Toribari) Phuentsholing, Chhukha
Bhutan

Page : 2 of 2
Certificate No.: EIPL/SLM/2019-20/86
Date of calibration: 08/12/2019

CLIBRATION RESULTS

CALIBRATION DATA GENETRATED FOR SOUND LEVEL METER Envirotech SLM -100 (Sl. NO. 347-DTA-2017)

Table 1

S. No.	Test Instrument		Reference Meter		Calibration Factor	Expanded Uncertainty
	Test Unit Reading (dB)	Avg. Test Unit Reading (dB)	Reference Meter Reading (dB)	Avg. Reference Meter Reading (dB)		
1	93.0	93.1	94.0	94.0	1.010	1.71 dB
2	93.1		94.0			
3	93.0		94.0			
4	93.1		94.0			
5	93.0		94.0			
6	93.1		94.0			
7	112.8	112.8	114.0	114.0	1.011	1.71 dB
8	112.7		114.0			
9	112.7		114.0			
10	112.7		114.0			
11	112.8		114.0			
12	112.8		114.0			

Calibrated By: Checked by: Certified By:

CALIBRATION CERTIFICATE FOR MICRO DUSTEC - 5003

Report No: IPM-5003/2019-20/10013-02

Name of the Client	Calibrated on:	Calibration Due on:	Environmental Details:
M/s. Bhutan Ecolab	27.01.2020	26.01.2021	Temperature : (25 ± 2)°C Relative Humidity : (68±10) %

Details of Device Under Calibration [DUT]:	Details of Standard Instrument used for calibration [STD]:
Description : Instrumex Micro Dustec Real Time Dust Monitor Model No. : 5003 Range : Particulates – 0 to 2,000 µg/m3 Temperature – 0 to 60°C Humidity – 0 to 99.9% Serial No. : 11519	Description : 1) Alphasense Dust monitor & 2) Temperature Humidity Sensor Model No. : 1) OPC-N3 2) MHB-382SD Range : Particulates – 0 to 2,000 µg/m3 Temperature – 0 to 60°C Humidity – 0 to 99.9% Serial No. : 17696423 & Q20192034

Calibration Results:

	PM1.0			PM2.5			PM10			Temperature			Humidity		
Time	STD	DUT	% ERR	STD	DUT	% ERR	STD	DUT	% ERR	STD	DUT	% ERR	STD	DUT	% ERR
12:00:00 PM	29.77	31.23	4.90	40.93	37.58	1.64521	102.48	93.79	10.0438	27.4	27.2	0.72993	[illegible]	[illegible]	[illegible]
12:15:00 PM	27.71	30.1	-8.63	37.68	30.21	-6.87247	187.43	175.42	-3.52838	27.6	27.3	1.08696	44.1	43.8	[illegible]
12:30:00 PM	15.09	16.02	6.16	20.43	21.07	0.66854	68.6	56.45	0.68224	27.8	27.5	1.07914	[illegible]	[illegible]	[illegible]
12:45:00 PM	16.87	16.58	1.72	23.53	21.19	10.0642	89.95	84.83	5.69091	27.9	28	0.35842	[illegible]	[illegible]	[illegible]
1:00:00 PM	18.77	15.93	14.90	24.7	21.03	9.91242	59.27	61.5	[illegible]	[illegible]	[illegible]	[illegible]	44.5	[illegible]	[illegible]
1:15:00 PM	16.69	14.62	11.34	22.6	18.96	-6.742	61	88.53	2.90007	28.9	29.2	1.01890	45.5	[illegible]	[illegible]
1:30:00 PM	15.93	15.61	2.13	20.83	19.74	0.11632	48.23	61.6	[illegible]	29.5	29.8	[illegible]	45.9	[illegible]	[illegible]
1:45:00 PM	18.82	15.22	3.16	20.85	19.56	-3.35889	68.03	49.18	2.69565	29.8	30.1	-1.00671	46	[illegible]	[illegible]
2:00:00 PM	14.9	15.24	-2.28	15.54	19.77	-4.8381	42.37	58.64	2.48125	[illegible]	30.4	[illegible]	46	[illegible]	5.21739
2:15:00 PM	16.22	15.52	4.26	21.81	22.75	12.463	57.74	41.94	2.80197	30.2	30.4	[illegible]	45.4	[illegible]	[illegible]
2:30:00 PM	15.65	15.68	0.19	20.90	[illegible]	1.18592	72.20	84.28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2:45:00 PM	16.93	[illegible]	11.75	21.91	21.7	[illegible]	60.72	78.51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3:00:00 PM	16.49	14.9	9.64	22.04	20.61	8.71515	70.22	58.33	5.03575	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3:15:00 PM	[illegible]	16.18	3.39	21.88	21.76	2.7507	[illegible]	145.50	0.11381	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3:30:00 PM	15.76	15.54	7.28	21.81	20.44	3.08576	80.73	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3:45:00 PM	[illegible]	14.79	7.68	21.3	19.3	6.96398	98.53	109.27	[illegible]	[illegible]	32	[illegible]	[illegible]	[illegible]	[illegible]
4:00:00 PM	16.02	14.75	11.20	21.67	19.01	4.91743	52.66	69.71	5.85391	[illegible]	[illegible]	[illegible]	44.8	[illegible]	[illegible]
4:15:00 PM	16.74	15.52	7.29	22.72	20.27	-4.61538	67.49	82.94	6.58132	[illegible]	31.9	[illegible]	44.6	[illegible]	[illegible]
4:30:00 PM	16.56	14.25	13.95	22.21	18.29	4.18278	150.15	167.89	[illegible]	30.4	30.8	1.31579	44.4	43	[illegible]
4:45:00 PM	[illegible]	15.41	2.53	20.04	19.8	9.1133	136.88	149.85	4.17237	30.7	31	[illegible]	44.3	[illegible]	[illegible]
5:00:00 PM	16.11	14.78	8.26	22.32	18.57	-7.47384	165.88	178.49	-7.30634	31.2	31.5	0.96154	44.3	42.8	3.386
5:15:00 PM	16.29	15.31	6.02	21.37	19.37	-10.4901	59.54	57.66	-5.01081	31.6	32	-1.26582	44.3	42.8	3.386
5:30:00 PM	16.57	16.01	3.26	22.44	21.02	5.6568	70.90	79.26	2.85866	32.3	32.9	1.85759	44.2	42.8	3.15742
5:45:00 PM	16.04	15.46	3.62	21.41	20.02	4.92104	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.52439	[illegible]	[illegible]	[illegible]
6:00:00 PM	16.57	15.40	6.23	22.35	19.22	[illegible]	[illegible]	110.48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6:15:00 PM	16.77	15.39	[illegible]	22.14	19.67	[illegible]	[illegible]	[illegible]	10.7161	[illegible]	33.9	[illegible]	[illegible]	[illegible]	[illegible]
6:30:00 PM	[illegible]	[illegible]	9.07	22.05	21.24	[illegible]	[illegible]	63.21	[illegible]	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]
6:45:00 PM	17.76	15.47	12.89	22.74	[illegible]	-9.74688	[illegible]	[illegible]	[illegible]	[illegible]	34.1	[illegible]	[illegible]	[illegible]	[illegible]
7:00:00 PM	[illegible]	15.47	2.77	20.81	21.26	7.30782	61.9	48.17	[illegible]	[illegible]	33.8	[illegible]	[illegible]	[illegible]	[illegible]
7:15:00 PM	16.42	15.56	5.24	21.23	20.95	2.01751	50.29	66.51	1.86368	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]
7:30:00 PM	15.75	15.75	0.00	20.33	21.34	7.42202	[illegible]	[illegible]	[illegible]	[illegible]	34.5	[illegible]	[illegible]	[illegible]	[illegible]
7:45:00 PM	[illegible]	16.03	[illegible]	[illegible]	21.18	9.01789	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8:00:00 PM	[illegible]	14.88	10.14	[illegible]	19.89	6.47741	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8:15:00 PM	[illegible]	15.55	4.54	[illegible]	[illegible]	5.23438	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
AVERAGE	17.06	16.31	4.67	22.94	21.24	-2.29	86.28	91.85	-1.99	31.46	31.69	-0.67	44.67	43.04	3.63

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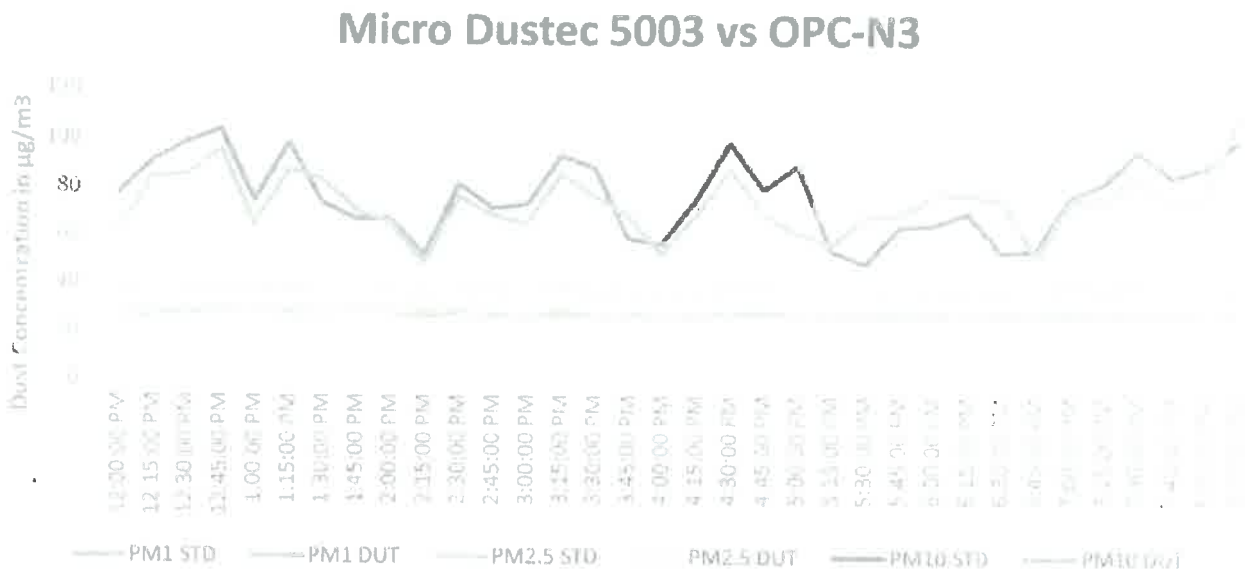
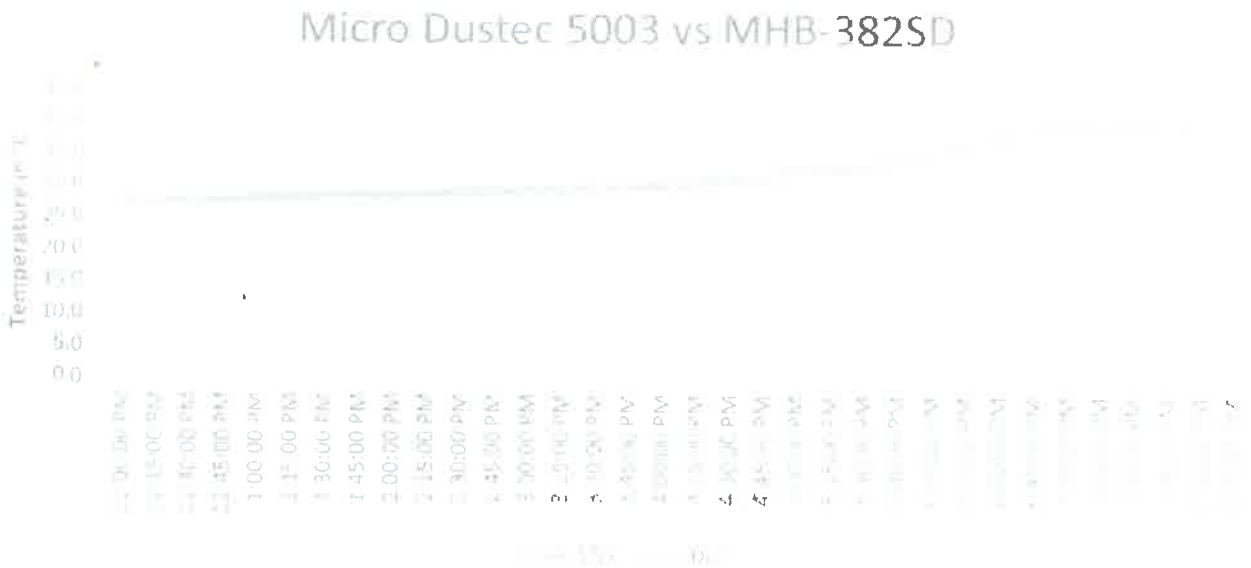
Calibration Curve for Particulates:



Calibration Curve for Temperature:



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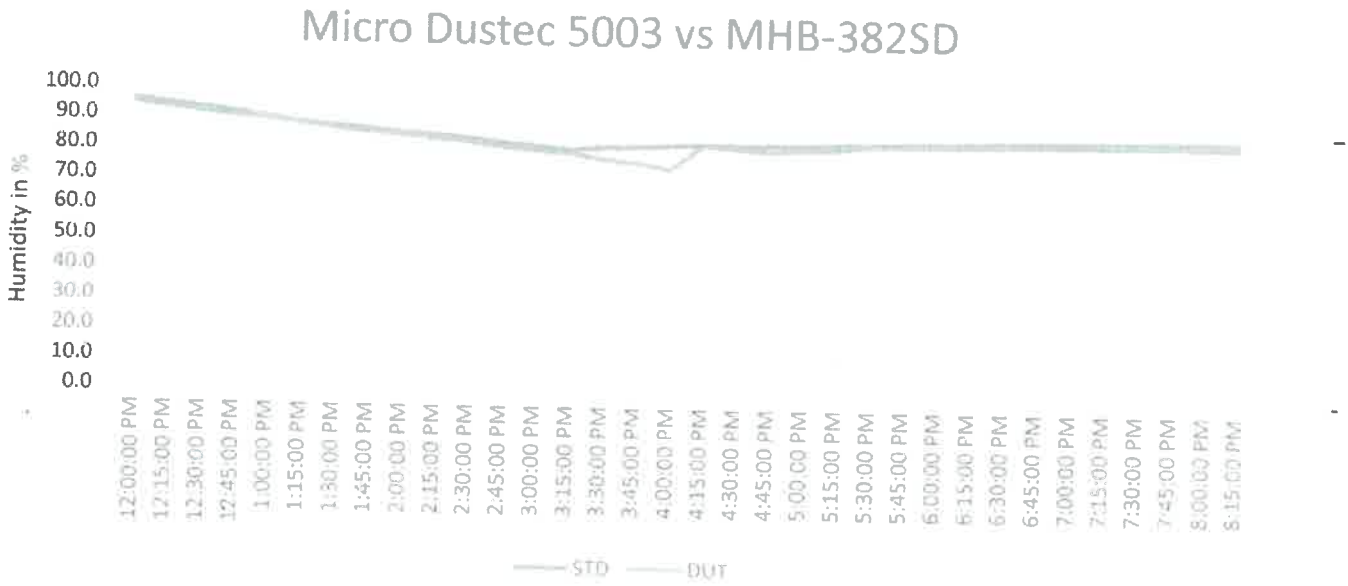
Calibration Curve for Humidity:



Remarks:

- Calibration Method : Comparison with standard device
- 8 hour test was performed on the Device Under Test (DUT) and the Standard Device (STD)
- The average percentage error of 8 hour run was within the acceptable limits.
- Results reported are valid at the time of and under the stated conditions of measurement

Calibrated by:
Naeem K.
Certificate Prepared by:
Rishabh K.
Certificate Checked by:
Radheshyam K.

Factory Certificate Stamp

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CALIBRATION CERTIFICATE FOR MICRO DUSTEC - 5003

Report No: IPM-5003/2019-20/11600-01

Name of the Client	Calibrated on:	Calibration Due on:	Environmental Details:
M/s. Bhutan Ecolab	27.01.2020	26.01.2021	Temperature : (27 ± 1)°C Relative Humidity : (85 ±10) %

Details of Device Under Calibration [DUT]:	Details of Standard Instrument used for calibration [STD]:
Description : Instrumex Micro Dustec Real Time Dust Monitor	Description : 1) Alphasense Dust monitor & 2) Temperature Humidity Sensor
Model No. : 5003	Model No. : 1) OPC-N3 2) MHB-382SD
Range : Particulates – 0 to 10,000 µg/m3 Temperature – 0 to 60°C Humidity – 0 to 99.9%	Range : Particulates – 0 to 10,000 µg/m3 Temperature – 0 to 60°C Humidity – 0 to 99.9%
Serial No. : 11600	Serial No. : 17688032 & Q20180132

Calibration Results:

	PM1.0			PM2.5			PM10			Temperature			Humidity		
Time	STD	DUT	% ERR	STD	DUT	% ERR	STD	DUT	% ERR	STD	DUT	% ERR	STD	DUT	% ERR
12:00:00 PM	14.22	17.08	-20.07	21.98	14.76	32.85	30.14	21.34	29.20	27.8	27.9	-0.36	95.1	94.1	1.10
12:15:00 PM	18.53	16.44	11.26	26.74	25.78	3.61	28.98	34.68	-19.66	27.7	27.1	2.17	94.1	92.8	1.35
12:30:00 PM	15.94	18.24	-14.42	22.70	26.34	-16.02	25.04	27.08	-8.13	27.7	27.2	1.81	92.8	91.3	1.57
12:45:00 PM	17.57	13.46	23.37	25.12	25.29	-0.67	26.52	35.18	-32.64	27.7	27.2	1.81	91.4	90.1	1.37
1:00:00 PM	19.83	16.42	17.20	30.42	32.54	-6.95	115.67	107.19	7.32	27.7	27.6	0.36	89.7	89.4	0.30
1:15:00 PM	18.74	17.75	5.29	29.31	23.06	21.35	34.95	48.84	-39.74	27.6	27.7	-0.36	88.1	87.9	0.21
1:30:00 PM	17.26	18.65	-8.03	25.90	25.18	2.80	33.94	24.38	28.18	27.6	27.4	0.72	87.2	86.4	0.96
1:45:00 PM	19.66	16.02	18.53	30.99	25.22	18.63	97.42	108.23	-11.10	27.5	27.3	0.73	86.3	85.5	0.94
2:00:00 PM	18.37	15.86	13.66	27.85	23.89	14.21	30.39	26.35	13.30	27.5	27.3	0.73	85.1	84.4	0.77
2:15:00 PM	16.68	16.22	2.79	23.27	23.92	-2.79	25.91	31.43	-21.33	27.6	27.2	1.45	84.6	83.5	1.30
2:30:00 PM	20.12	14.02	30.32	29.52	23.62	19.98	33.72	31.43	6.78	27.5	27.1	1.45	83.5	82.4	1.37
2:45:00 PM	14.76	15.55	-5.36	24.14	22.05	8.69	28.00	28.78	2.77	27.5	27.1	1.45	82.3	81	1.55
3:00:00 PM	18.84	13.24	29.71	27.39	22.81	16.73	31.49	24.25	23.01	27.5	27.1	1.45	81.3	79.8	1.85
3:15:00 PM	17.50	14.60	16.58	23.49	18.65	20.62	25.22	24.34	1.48	27.6	27.1	1.81	80.3	79	1.66
3:30:00 PM	19.03	16.12	15.28	28.84	22.30	22.68	29.90	31.32	-4.76	27.5	27.1	1.45	81.4	77.2	5.16
3:45:00 PM	18.03	15.54	13.81	27.47	20.32	26.03	31.45	27.29	13.21	27.6	27.1	1.09	81.5	75.9	6.87
4:00:00 PM	18.04	16.61	7.90	28.46	23.13	18.74	32.05	25.08	21.75	27.5	27.2	1.09	82.0	74	9.76
4:15:00 PM	15.68	18.45	-17.62	23.71	25.06	-5.70	27.78	25.10	9.63	27.5	27.1	1.45	82.4	82.3	0.15
4:30:00 PM	18.45	16.63	9.85	24.01	26.32	-9.65	38.81	42.43	-9.31	27.4	26.9	1.82	82.3	81.3	1.21
4:45:00 PM	15.34	15.23	0.70	21.54	24.82	-15.22	37.83	34.39	9.10	27.4	26.8	2.19	82.6	80.3	2.74
5:00:00 PM	17.77	15.37	13.51	25.70	21.20	17.49	27.27	28.35	-3.97	27.3	26.9	1.47	82.8	81.4	1.69
5:15:00 PM	20.38	15.35	24.70	30.74	23.27	24.31	34.12	28.44	16.67	27.3	26.8	1.83	83.2	81.5	2.04
5:30:00 PM	17.34	14.01	19.20	26.52	24.20	8.75	31.29	24.47	21.80	27.2	26.8	1.47	83.5	83.0	0.60
5:45:00 PM	16.59	18.47	-11.32	24.51	20.38	16.84	27.91	30.46	-9.13	27.2	26.8	1.47	83.9	83.2	0.83
6:00:00 PM	18.07	17.97	0.53	27.20	24.28	10.74	29.57	23.51	20.49	27.1	26.7	1.48	84.0	83.1	1.07
6:15:00 PM	13.96	14.38	-3.02	20.28	25.06	-23.57	23.38	26.59	-13.73	27	26.7	1.11	84.3	83.2	1.30
6:30:00 PM	18.06	15.90	11.95	26.79	22.74	15.11	105.12	116.04	-10.38	26.8	26.6	0.75	84.7	83.6	1.30
6:45:00 PM	16.10	14.91	7.36	24.60	24.13	1.92	25.93	29.25	-12.80	26.8	26.6	0.75	84.8	84	0.94
7:00:00 PM	16.89	16.30	3.53	24.01	21.67	9.74	25.88	26.30	-1.62	26.9	26.6	1.12	85.0	84	1.18
7:15:00 PM	16.12	18.57	-15.19	23.06	24.16	-4.79	25.34	22.98	9.34	27	26.7	1.11	85.2	84	1.41
7:30:00 PM	15.69	16.37	-4.30	22.36	28.09	25.63	24.34	20.14	17.25	27.4	27.1	1.09	85.4	84.1	1.52
7:45:00 PM	18.76	16.47	12.21	28.80	23.03	20.05	34.23	38.38	-12.14	27.5	27.2	1.09	85.7	84.2	1.75
8:00:00 PM	18.46	17.22	6.73	26.88	23.51	12.54	29.03	24.24	16.50	27.5	27.2	1.09	85.9	84.1	2.10
8:15:00 PM	17.72	16.63	6.14	26.76	25.13	6.10	67.23	74.62	-10.99	27.6	27.3	1.09	85.6	84	1.87
AVERAGE	**17.49**	**16.18**	6.55	**25.91**	**23.70**	7.65	**37.52**	**37.44**	1.26	**27.41**	**27.08**	1.21	**85.23**	**83.71**	1.82

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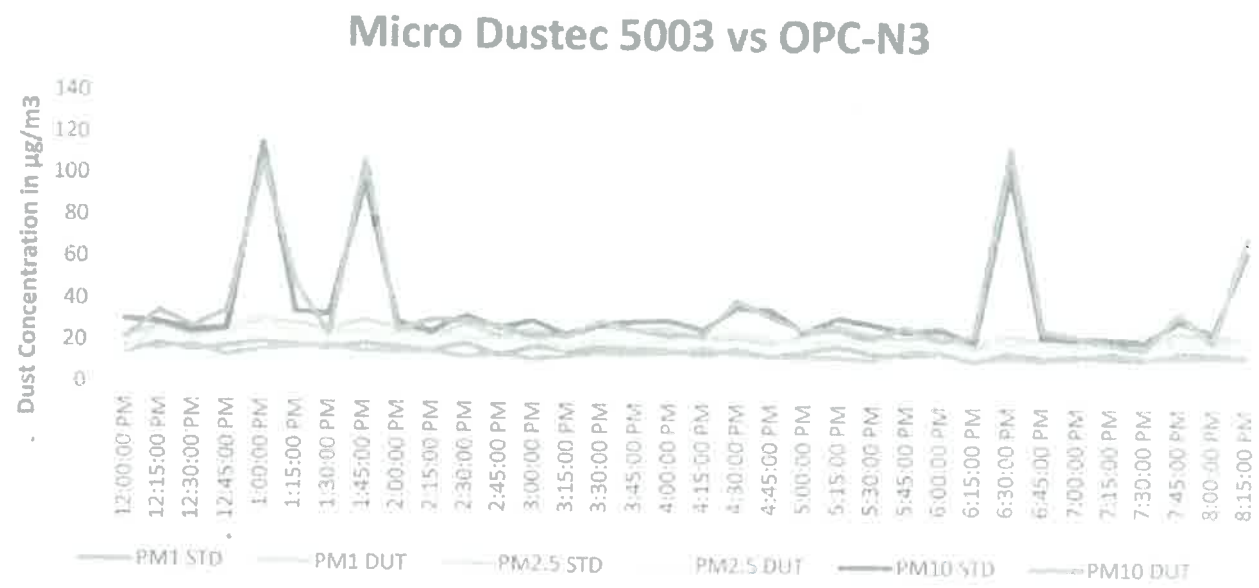
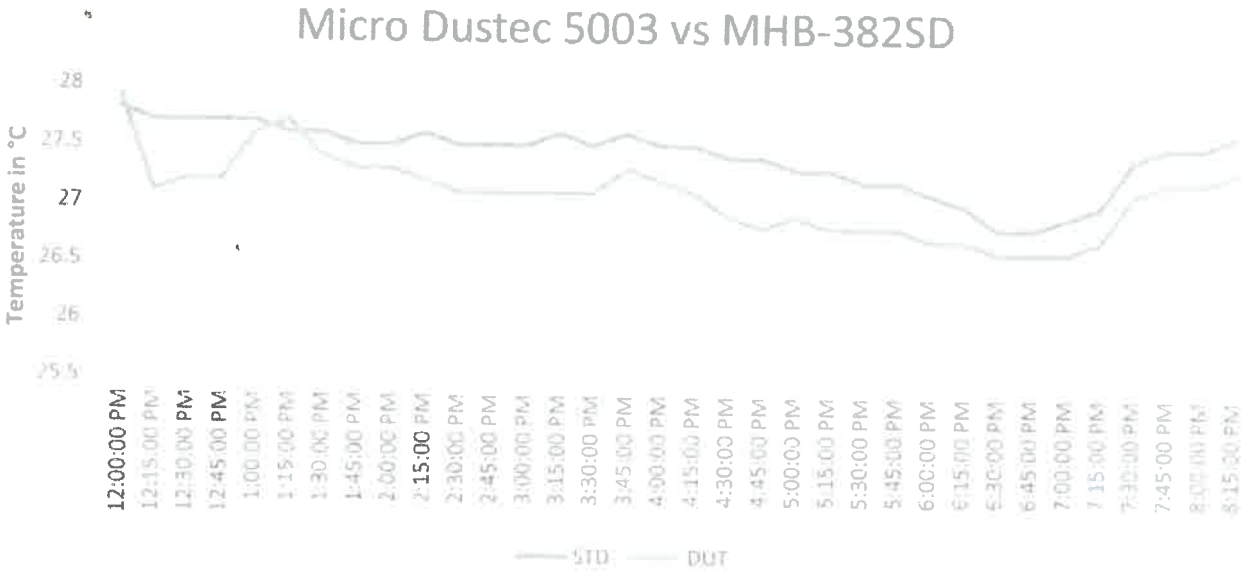
Branch Office : # 398, 15th Main, 4th T Block, Jayanagar, Bangalore - 560 041, India | Email: info@instrumex.net

Calibration Curve for Particulates:



Calibration Curve for Temperature:



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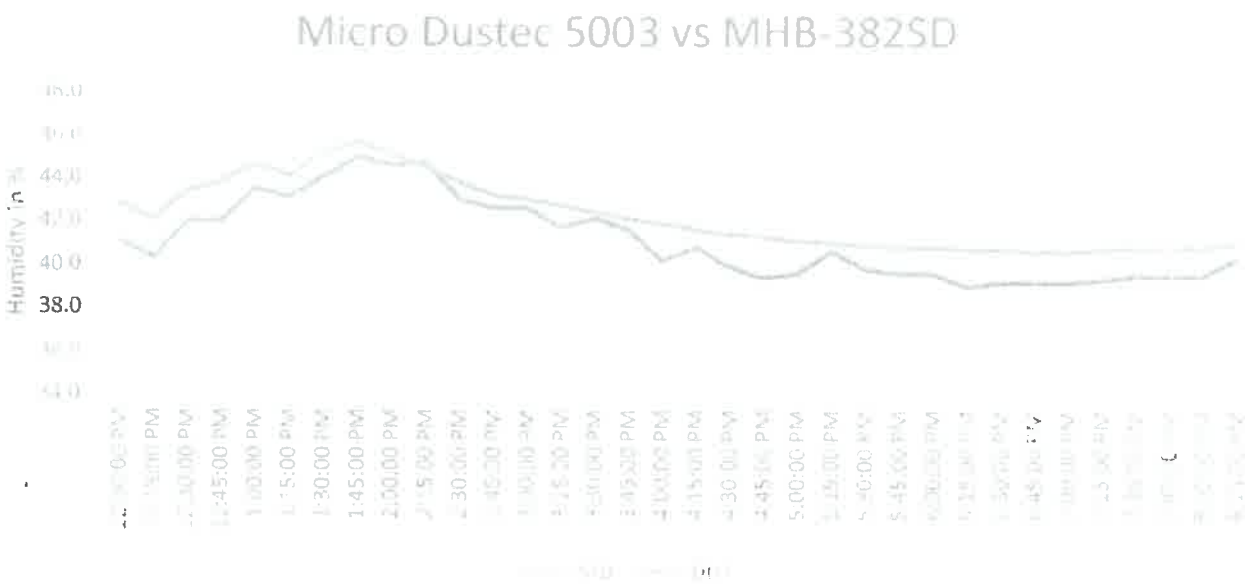
Calibration Curve for Humidity:



Remarks:

- Calibration Method : Comparison with standard device
- 8 hour test was performed on the Device Under Test (DUT) and the Standard Device (STD)
- The average percentage error of 8 hour run was within the acceptable limits.
- Results reported are valid at the time of and under the stated conditions of measurement

Calibrated by:	
Naeem K.	
Certificate Prepared by:	
Rishabh K.	
Certificate Checked by:	
Radheshyam K.	

Factory Certificate Stamp

Manufacturers of Air Quality Monitoring Instruments

Regd. Office & Works: A-271, Okhla Industrial Area, Phase-I, New Delhi-110020, India Tel: 26814139 / 26813887
91 11 26811833 E-mail : sales@envirotechindia.com Website : www.envirotechindia.com CIN: U74899DL1983PTC016927

Certificate No.: EIPL/RDS/2019-20/380

Date of calibration: 08/12/2019

M/s Bhutan Eco –Lab Services
Pekarzhing (Toribari) Phuentssholing, Chhukha
Bhutan

CALIBRATION CERTIFICATE

This is to certify that Respirable Dust Sampler, Make Envirotech, Model APM 460 NL (Sl. No. 1400-DTL-2016) and Gaseous Sampling Attachment, Make Envirotech, Model APM 411TE (S. No. 1806-DTG-2016) have been calibrated by EIPL. Details of Reference Equipment used for calibration.

Traceability Statement:	All the following Reference Equipments used to calibrate Sampler, are traceable to National Standards.		
Calibrator Name	**Make**	**Model & S.No.**	**Certificate Report No.**
Top Loading Calibrator Calibrated at ECL, New Delhi	Envirotech	APM421 85	**ECL/ECL/2018-19/FLOW/3548** Dt. 02/01/2019
Differential Pressure Meter Calibrated at ECL New Delhi	Testo	510 43401225/301	**ECL/ECL/2018-19/MECH/4504** Dt. 25/02/2019
Diaphragm Gas Meter Calibrated at ECL, New Delhi	Itron	Gallus 2016 160540333	**ECL/ECL/2019-20/FLOW/1749** Dt. 24/07/2019
Stop Watch Calibrated at ECL, New Delhi	Racer	396	**ECL/ECL/2019-20/ET/1603** Dt. 11/07/2019

Recalibration is due on 07/12/2020 or after a major repair/overhaul.

For Envirotech Instruments Pvt. Ltd

(Authorized Signatory)

Envirotech Instruments Pvt. Ltd.,

M/s Bhutan Eco –Lab Services
Pekarzhing (Toribari) Phuentssholing, Chhukha
Bhutan

Certificate No.: EIPL/RDS/2019-20/380

Date of calibration: 08/12/2019

CALIBRATION RESULTS

1. CALIBRATION DATA GENETRATED FOR RESPIRABLE DUST SAMPLER Make Envirotech, Model APM 460 NL (Sl. NO- 1400-DTL-2016)

Manometer

S. No.	Test Piece Measured Flow Rate (m^3/min)	Reference Flow Rate (m^3/min)	Calibration Factor	Expanded Uncertainty (K=2)
1	0.840	0.848	1.009	±1.10%
2	0.950	0.937	0.986	±1.10%
3	1.040	1.052	1.011	±1.10%
4	1.140	1.151	1.010	±1.10%
5	1.200	1.203	1.003	±1.10%

Time Totalizer

S. No.	Time Totalizer Reading (Hrs)		Test Piece Measured Time (Min)	Reference True Time(min)	Calibration Factor	Expanded Uncertainty
	I.Reading	F.Reading				
1	349.30	349.80	30	30	1.000	±0.13 min
2	349.80	350.30	30	30	1.000	±0.13 min
3	350.30	350.80	30	30	1.000	±0.13 min

2. CALIBRATION DATA GENETRATED FOR GASEOUS SAMPLING ATTACHMENT Make Envirotech, Model APM 411 TE (Sl. No. 1806-DTG-2016)

Rotameter (0-3)lpm (Sl. No. 16/0930)

S. No.	Test Piece Measured Flow Rate (lpm)	Reference Flow Rate (lpm)	Calibration Factor	Expanded Uncertainty
1	0.5	0.510	1.020	±2 36%
2	1.0	1.010	1.010	±2.36%
3	1.5	1.510	1.007	±2.36%
4	2.0	2.020	1.010	±2.36%
5	2.5	2.475	0.990	±2.36%
6	3.0	2.998	0.999	±2.36%

Calibrated by

Checked by

Certified by

QF992502

PURCHASE ORDER

Draft Copy

Afcons- Bhutan Project
Bhutan Bhutan
Tel.No.
Fax.No.

Supplier : 113789
Instrumex
106, Ashish Udhyog Bhavan, Opp SNDT Malad West,
Mumbai - 400064 mumbai mumbai 400064 Maharashtra India

Tel No : 9322235281
Fax No : N/A
Email No : sales@instrumex.net
Contact : Vidya S. / 9322235281
Supplier GSTN: 27AFNPK8304B1ZL

Purchase Order No : 4500378854 **Date :** 01.07.2020
Project : 6462 Construction of River Training & Ebarkment works for
Payment Terms : 100% advance against Proforma Invoice
Incoterms: -
Billed To : AFCONS INFRASTRUCTURE LTD. Constriction of river training & Ebarkment Work, Phuentsholing Township Development Project, Bhutan, Post Box No, 247,
Shipped To: AFCONS INFRASTRUCTURE LTD. Constriction of river training & Ebarkment Work, Phuentsholing Township Development Project, Bhutan, Post Box No, 247,

Contact :
Billed to GSTN :

Sr No.	Item Description	Quantity	UOM	Delivery Date	Base Rate(INR)	Discount	Net Rate	Tax%	HSN/SAC	Total Amount (INR)
1	FA02184 - Air Pollution Monitoring System Real Time Dust Monitor,DUSTEC-5003, with Battery **Asset Description** Air Pollution Monitoring System-Instrumex--6462	1.000	NOS	30.07.2020						

Taxes applicable are as following ;

1. D0 - Zero Tax Code

Remarks

1. Reference: This has reference as Per Price Qtn. I/2020-21/LQ-29

2. General: Progress of our PTDP site, entirely depends upon timely supplies made by you. Hence, please note that timely supplies of material confirming to specifications indicated in the order is essence of this contract.

If you fail to make supplies as per delivery schedule given in the order / by site, we reserve our right to make alternative arrangement for procurement from other sources at your risk and cost.

Kindly send us your acceptance within 3 days otherwise it will be taken as acceptance by you.

Please mention our order reference in all the delivery challan & invoice has to be submitted accounts department at our main office. Drawing reference whenever applicable must be mentioned in the delivery challan/invoice

Purchase order value is inclusive of all taxes and duties.

Checked By

For Afcons- Bhutan Project

Note : Acceptance of this order constitute an acceptance of the terms and conditions on face reverse thereof
Indent Ref : ,2000253620Dtd.01.07.2020

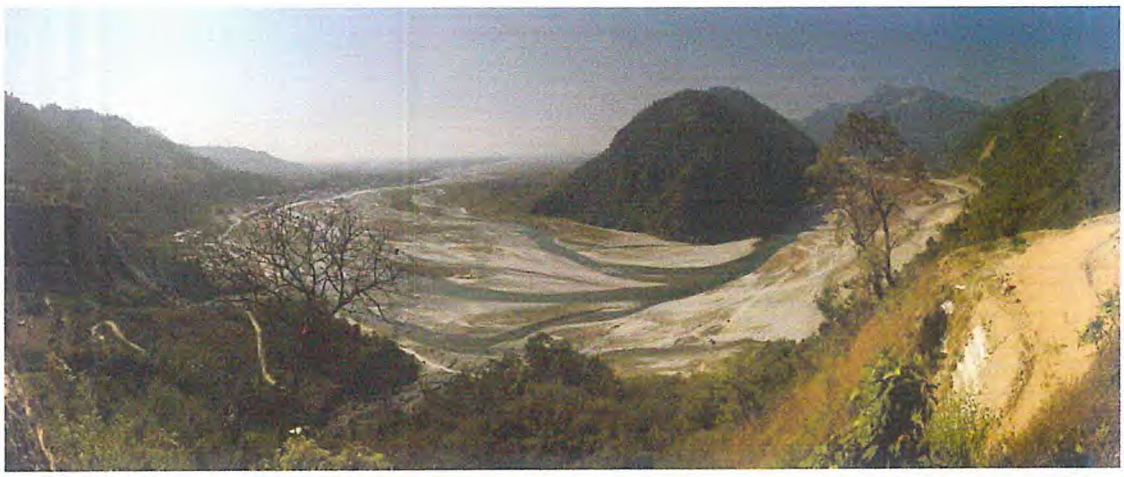
Appendix 18

Fourth Terrestrial Survey Report:
Terrestrial Survey along the Phuentsholing Township Development Project

(Zone A and Zone B)

March – May, 2020

Phuentsholing, Chhukha Dzongkhag



Bhutan Ecolab Services

Phuntsholing

BHUTAN

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ACONS INFRASTRUCTURE LTD.

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AFCONS INFRASTRUCTURE LTD.

GLOSSARY

A

ANNUAL PLANTS: Plants that complete their life cycle in one growing season.
AVIFAUNA: The birds, or all kinds of birds, inhabiting a region.

B

BIENNIAL PLANTS: Plants that requires two years to complete their life cycle.

C

CRITICALLY ENDANGERED(CN): A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
CREEPER: Any plant that grows along the ground, around another plant through extending stems or branches.

D

DATA DEFICIENT (DD): A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable time has elapsed since the last record of the taxon, threatened status may well be justified.
DECIDUOUS PLANTS: Trees and shrubs that seasonally shed their leaves usually in autumn or the cold winters.
DZONGKHA: Is official and the national language of the kingdom of Bhutan.

E

ENDANGERED (EN): A taxon is endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

F

FAUNA: Animals considered a group, especially those of a particular country, region, time, etc.
FLORA: Plants considered a group, especially those of a particular country, region, time, etc.

G

GRASS: Vegetation consisting of typically short plants with long, narrow leaves, growing wild or cultivated on lawns and pasture, and as a fodder crop.

H

HERBACEOUS PERENNIAL PLANT: Shoot of this type of plant die to the ground in winter, but the root system survives the winter and the new shoot grows back in the spring.
HERBACEOUS: Any seed-bearing plant which does not have a woody stem and dies down to the ground after flowering.

L

LEAST CONCERN (LC): A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
LEAVE ABSCISSION: The natural detachment of leaves a plant/tree depending on their shedding seasons

M

MONOCARPIC PLANT: These plant flowers only once in their lifetime which can be either annual or biennial and the plant die after flowering and fruiting.

N

NEAR THREATENED (NT): A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category soon.

NOT EVALUATED (NE): A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

P

PERENNIAL PLANTS: Plants that have life cycle that goes beyond two years.

POLYCARPIC PLANT: These plant flowers every year and are a perennial plant which does not die after flowering and fruiting.

PRIMARY DATA: Data that is collected by a research from first-hand sources, using methods like surveys, interviews, or experiments.

R

RIPARIAN BUFFER/ BUFFER ZONE: Is an area of vegetation around the body of water that gives benefits to the ecosystem (Distance of 15 ft. from the river bank).

S

SECONDARY DATA: Data that is collected from studies, surveys, or experiments that have been done by other people or for other research.

SHRUB: A woody plant which is smaller than a tree and has several main stems arising at or near the ground.

V

VINE: A dimbing or trailing woody-stemmed plant.

VULNERABLE (VU): A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

W

WOODY PERENNIAL PLANT: Top of these plants persist through winter. In spring shoot growth resumes from the adventitious buds.

ABBREVIATION

CDCL	:	Construction Development Corporation Limited
EIA	:	Environmental Impact Assessment
FNCR	:	Forest and Nature Conservation Regulation
IUCN	:	International Union for Conservation of Nature and Natural Resources
ADB	:	Asian Developmental Bank
BES	:	Bhutan Ecolab Services
PTDP	:	Phuentsholing Township Development Project

SYNONYMOUS

Flora	:	Plants
Fauna	:	Animals
Avifauna	:	Birds
Official	:	Officials from the Forest Range Office, Phuentsholing, under department of Forest and Park Services
Project	:	Phuentsholing Township Development Project focused on Zone A and B
EIA report	:	Amochhu EIA Report, 2017.

1. INTRODUCTION

Phuentsholing falls under Chhukha Dzongkhag and it is located adjacent to Bhutan and the Indian border with a geographical area of 139.8sq.km. In the recent years, Phuentsholing is facing problems of increasing population with a limited area (Amochhu EIA report, 2017); adding to this, the Amochhu River threatens to flood, erode and cause loss of valuable land resulting in sedimentation downstream. Hence, Phuentsholing Township Development Project, contracted to AFCONS Infrastructure Limited by CDCL with their main consultant as Egis International and Gyeltshan consultancy as the sub-consultant, are working on the Construction of River Training and Embankment Work along the Amochhu River. In the course of the construction works, it is crucial to monitor and maintain the ecological health i.e. Terrestrial and Aquatic environment within and the areas adjacent to the project sites. Accordingly, this report is comparative of findings of the studies conducted for the Fourth Terrestrial Survey (dates of the surveys mentioned in **Table 1**) to the findings of the First, Second and Third Terrestrial Surveys that were previously conducted in Zone A, Zone B and its buffer areas of the project. It is to be noted that the First Terrestrial Survey was focused on the density of species for the flora assessment and diversity of species for the avifauna and fauna assessment and so comparisons were made with the species listed in the report. However, as the focused of the first terrestrial report was more on density than diversity of species, it should be noted that the less count of species during the summer terrestrial report does not completely define the diversity of flora species during the season.

On the recommendation of the forest officials, mobile/android applications (specifications mentioned in **appendix 2**) were used to identify the plant species; the mobile application identified plants were later checked and verified (**appendix 3**) by Forest BEAT In-charge, Samtse and the Phuentsholing Range Office. The fauna and avifauna species were recorded through sightseeing and by survey questionnaires with the locals. The secondary data were collected through available literature or publications.

Below are dates of when the Walkthrough and the Questionnaire Survey for the Fourth Terrestrial Survey was conducted:

Table 1: Dates for the Fourth Terrestrial Survey

Month	Date
March	18-03-2020
April	16-04-2020 to 17-04-2020
May	16-05-2020

PHUENTSHOLING

AFCONS INFRASTRUCTURE

2. SCOPE

Relative to the last terrestrial surveys conducted, the Fourth Terrestrial Assessment is focused on the diversity of the terrestrial resources i.e. flora, fauna and avifauna within the Phuentsholing Township Development Project specifically in zone A and zone B (and also along with each zone's buffer points). The Fourth report is comparative of findings from the First, Second and the Third Terrestrial Survey.

This report is a compilation of findings for the studies carried out once every month (dates specified in the introduction **Table 1**) for three months (March-May 2020). Primary and secondary data were collected for this report. Primary data collection involved field studies conducted using mobile applications recommended by the Forest Office and through survey questionnaires (photographs attached as **appendix 6**) designed for locals. As the data from the survey questionnaire falls under the primary data source, pictures of some of the primary findings may not be available. Secondary data involves the reference of books and other resources.

For the flora diversity assessment, focuses on the trees, herbaceous and shrubs, climbers, creepers and vines and on grass species. Here, grass species only covers the species of bamboo and other big grass species. Orchids are not covered for this study. The field study was done by the use of android applications for identifying the flora species in addition to taking of samples of any new species detected to the Phuentsholing Forest Office for confirmation and identification, respectively. Pictures of the Flora species found during the Fourth Terrestrial Survey are attached as **appendix 5.**

For the fauna and avifauna diversity assessment, field study and questionnaires surveys were conducted. However, as the field study was conducted during the day time, finding fauna and avifauna species were difficult to note, especially the nocturnal species. Hence, most of the findings for fauna and avifauna species are from the survey questionnaire, thus no photographs have been attached. It is recommended that for better identification, advance measures such as camera traps could be used. It is to be noted that the study, based on Fauna species only covers mammals, skipping the reptiles, amphibians and insects.

3. AIMS & OBJECTIVES

Aim of Study : Assess Terrestrial Ecological Diversity within the Phuentsholing Township Development Project i.e. PTDP (zone A, B and their respective buffer zone).

Objectives:

- Assess and record flora diversity in project Zone A, B and along its respective buffer zones concerning the changing season.
- Assess and record the diversity of fauna, avifauna and presence of national and IUCN red listed species within the project area.
- Assess and the record presence and absence of flora, fauna and avifauna species by comparing it to the findings of the last Terrestrial Studies.

4. METHODS & METHODOLOGY

4.1. Description of study area:

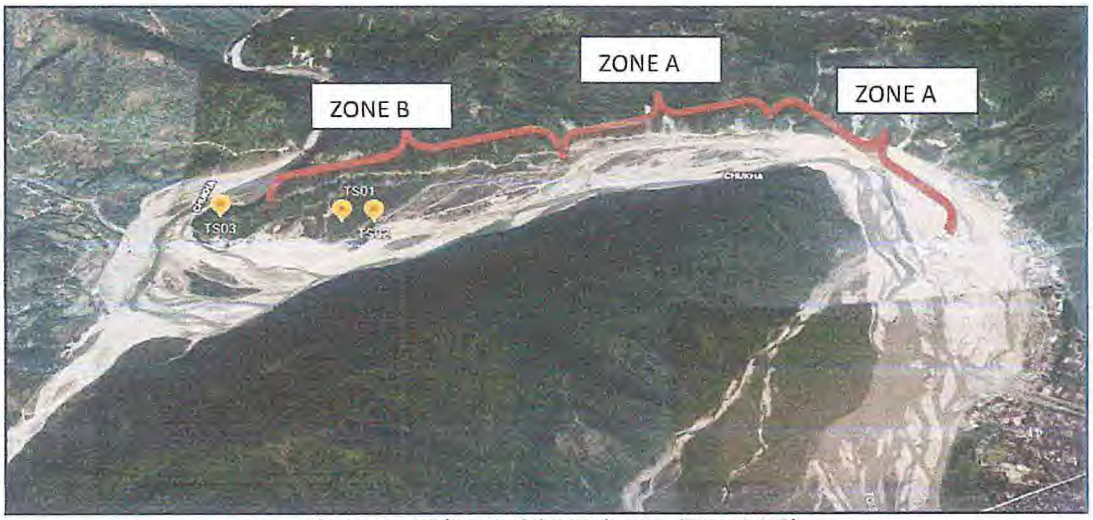

Figure 1: Arial view of the study area (Zone A & B).

The study was focused within the Project zone A & B of the Phuentsholing Township Development Project. The vegetation cover along the river banks was sparse and in patches in the Zone A while zone B is comparatively denser.

Table 2: Coordinates for the Study Area

Study Area	Coordinates	
	Start Point	End Point
Zone A	E187432.017 N2072188.422	E186562.867 N2975305.634
Zone B	E186562.867 N2975305.634	E183458.422 N2974315.442
Buffer Points	Points along zone A and B with vegetative growth below the Phuentsholing Samtse road.	

4.2. Materials required during the survey

- DSLR Camera
- Data collection form
- Pens and pencils
- GPS Device.

4.3. Methods and methodology

Similar to the last Terrestrial Assessment, primary data and secondary data were collected for the Fourth Terrestrial Assessment i.e. focusing on the diversity. Primary data collection was conducted in project Zone A, B and within its respective buffer area where diversity of flora, fauna and avifauna species were recorded. The primary recording methods include:

- Taking photographs, sightseeing and identification of species through mobile applications under the recommendation of the Forest Range office.

- Through survey questionnaires designed for locals residing near the study area (Questionnaire attached as **appendix 4**).

The secondary data on Terrestrial diversity of the Project area were gathered through national publications and reference from the Forest Range Office.

Aforementioned method was adopted for the study as the size of the project area is small, accessible and the vegetation coverage is not dense. Systematic sampling method can be applied if the diversity of species changes with altitude, temperature, pressure and humidity (micro-climate). However, micro- climatic factors of Zone A and B do not vary, and thus, a random sampling method was preferred.

A survey route was to be followed for the primary data collection for field study. However, a more random approach was taken (like in the previous Terrestrial Assessment) to cover all vegetative grounds. The Random Method makes it feasible to identify any growth of flora species in any distribution of vegetation in zone A and B.

4.3.1. Flora Diversity

Flora species diversity was assessed in Zone A, B and its buffer area by directly identifying the species with the help of plant identifying android applications (Leaf Spot & Plantifier) as recommended by the Forest Range Office and each identified plant was later verified with the help of foresters from the Forest Range office, Phuentsholing. Samples such as leaves, twigs, fruits, seeds, flowers, and photos were taken for further confirmation of its genus and species.

4.3.2. Fauna (mammal) Diversity

The diversity of fauna was assessed through a questionnaire survey and sightseeing. Additional information was collected from the Phuentsholing Forest Range Office, National Publications, Journals, etc.

4.3.3. Avifauna Diversity

The Avifauna species diversity was assessed through sightseeing and questionnaire survey. Additional information was collected from the Phuentsholing Forest Range Office, National Publications, Journals, etc.

5. FINDINGS

The collective findings from primary and secondary data are tabulated under its respective heading. All the findings are verified and corrected by Gedu Forest Division and the verification document is attached as **appendix 3** for reference. For flora diversity, the different types of plants are categorized and mentioned as: -

- Trees
- Shrubs and herbaceous
- Climber, creeper & vine, and Grasses.

5.1. Flora Diversity

The following table (**Table 3**) shows the total flora **(Trees)** species recorded during the Fourth Terrestrial Survey, which were also identified during the First, Second and the Third Terrestrial Survey. **Table 4** is representative of the additional flora species which were identified during the Fourth Terrestrial Survey. All the species highlighted are findings from the field study and not from the survey questionnaire and vice versa. The species are classified alphabetically based on their scientific name. The Local Name of each species is derivative to the *commonly known* basis, with preference given to the species name in Dzongkha (if available). The pictures of flora diversity recorded during the field study are attached as **Appendix 5**. Pictures are not available for all the findings from the questionnaire survey.

Table 3: Flora (Trees) species recorded during the Terrestrial Survey

Flora (Trees) diversity assessment of Zone A & B of PTDP (First, Second, Third & Fourth Terrestrial Survey)					
SN	**Scientific Name**	**English Name**	**Local Name**	**Lifecycle**	**IUCN Status**
1	*Acacia catechu*	Khair	Jaseng	Deciduous	Least Concern
2	*Albezia lebbeck*	Siris	Siris	Deciduous	Least Concern
3	*Albizzia Spp*	Flea tree	Siris	Deciduous	Least Concern
4	*Allaeanthus grandies*	Not-found	Gokul	Deciduous, Evergreen	Least Concern
5	*Bauhinia purpurea*	Orchid tree	Taki	Deciduous	Least Concern
6	*Bombax ceiba*	Cotton tree	Simal	Deciduous in winter	Least Concern
7	*Brassiopsis hispida*	Phutta	Phutta	Deciduous	Least Concern
8	*Carica papaya*	Papaya tree	Maywa	Evergreen	Least Concern
9	*Coriaria myrtifolia*	Redoul	Not found	Deciduous	Least Concern
10	*Delonix regia*	Gul mohur tree	Siris	Deciduous	Least Concern
11	*Duabonnga grandiflora*	Hummingbird tree	Lampatey	Deciduous	Least Concern
12	*Ficus auriculata*	Elephant ear fig	Nibaro	Semi-deciduous	Least Concern
13	*Ficus roxburgii*	Not-found	Nibaro	Semi-deciduous	Least Concern
14	*Ficus virens*	White fig	Nibaro	Deciduous	Least Concern
15	*Gmelina arborea*	Beech-wood/ gamhar	Gamari	Deciduous	Least Concern
16	*Garuga pinnata*	Garuga	Not-found	Deciduous	Least Concern
17	*Moringa oleifera*	Drumstick tree	Sajana	Deciduous	Least Concern
18	*Murraya koenigii*	Curry leaf tree	Burigondaey	Evergreen	Least Concern
19	*Premna latifolia*	Arani	Genari	Deciduous	Least Concern
20	*Senegalia catechu*	Black catachu	Not found	Deciduous	Least Concern
21	*Stereospermum tetragonum*	Snake tree	Hatipailey	Deciduous	Least Concern
22	*Terminalia microcarpa*	Damson Plum	Panisasz	Semi-deciduous	Least Concern
23	*Tetrameles nudiflora*	False hemp tree	Myana	Deciduous	Least Concern

Flora (Trees) diversity assessment of Zone A & B of PTDP (First, Second, Third & Fourth Terrestrial Survey)					
SN	**Scientific Name**	**English Name**	**Local Name**	**Lifecycle**	**IUCN Status**
24	*Ziziphus jujube*	jujube tree	Boyar	Deciduous, Evergreen	Least Concern

Table 4: New Flora (Tree) Species Recorded during the Fourth Terrestrial Survey

Flora (Herbaceous and shrubs) diversity assessment of Zone A & B of PTDP (Fourth Terrestrial Survey)					
SN	**Scientific Name**	**English Name**	**Local Name**	**Types**	**IUCN Status**
1	*Wrightia arborea*	Woolly Dying Rosebay	Not Found	Deciduous	Least Concern

Note: For the previous tabulations (**Table 3** and **4**) the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred

Table 5 shows the total flora **(Herbaceous and shrubs)** species recorded during the Fourth Terrestrial Survey, which were also identified during the First, Second and the Third Terrestrial Survey. **Table 6** is representative of the additional flora species i.e. Herbaceous and Shrubs which were identified during the Fourth Terrestrial Survey All the species highlighted are findings from the field study and not from the survey questionnaire and vice versa. The species are classified alphabetically based on their scientific name. The Local Name of each species is derivative to the *commonly known* basis, with preference given to the species name in Dzongkha (if available). The pictures of flora diversity recorded during the field study are attached as **appendix 5**. Pictures are not available for all the findings from the questionnaire survey.

Table 5: Flora (Herbaceous and shrubs) species recorded during the Terrestrial Survey

Flora (Herbaceous and shrubs) diversity assessment of Zone A & B of PTDP (First, Second, Third & Fourth Terrestrial Survey)						
SN	**Scientific Name**	**English Name**	**Local Name**	**Types**	**Lifecycle**	**IUCN Status**
1	*Acmella uliginosa*	Marsh papa cress	Not-found	Herbaceous	Herbaceous perennials	Least Concern
2	*Agerantum conyzoids*	Billygoat-weeds	Illamey	Herbaceous	Annuals	Least Concern
	Alternanthera sessillis	Sessiljoyweed	Not found	Herbaceous	Perennial	Least Concern
3	*Alysicarphus vaginalis*	White moneywort	Not-found	Herbaceous	Herbaceous perennials / Annuals	Least Concern
4	*Arthemisia vulgaris*	Mugwort	Patii	Herbaceous	Herbaceous perennials	Least Concern
5	*Ballota nigra*	Black horehound	Not-found	Shrubs	Herbaceous perennials	Least Concern
6	*Bidens pilosa*	Beggar-ticks	Kuro	Herbaceous	Annuals	Least Concern
7	*Chromolaena odorata*	Devil weed	Not-found	Shrubs	Herbaceous perennials	Least Concern
8	*Cinopodium vulgare*	Wild basil	Not-found	Herbaceous	Perennials	Least Concern
9	*Colocasia esculenta*	Taro	Doothmanay	Herbaceous	Perennials	Least Concern
11	*Coffea benghalensis*	Bengal coffea	Not found	Herbaceous	Perennial	Least Concern
12	*Colebrookea oppositifolia*	Indian squirrel Tail	Not found	Herbaceous	Perennial	Least Concern
13	*Crassocephalum crepidioides*	Redflower ragleaf	Not-found	Shrubs	Annuals	Least Concern
14	*Crotalaria spectabilis*	Snowy rattlepod	Not-found	Herbaceous	Biennials	Least Concern
15	*Erigeron bonariensis*	Flax- leaved fleabane	Not-found	Herbaceous	Herbaceous perennials	Least Concern

Flora (Herbaceous and shrubs) diversity assessment of Zone A & B of PTDP (First, Second, Third & Fourth Terrestrial Survey)						
SN	**Scientific Name**	**English Name**	**Local Name**	**Types**	**Lifecycle**	**IUCN Status**
16	*Erythrina aborescens*	Coral tree	Phaulaedo	Herbaceous	Perennial	Least Concern
17	*Eupatorium odorantum*	Siam weed	Banmara	Herbaceous	Herbaceous perennials	Least Concern
18	*Ipomoea nil*	Morning glory	Not-found	Herbaceous	Annuals	Least Concern
19	*Lamium album*	White dead-nettle	Not-found	Herbaceous	Herbaceous perennials	Least Concern
20	*Lantana camara*	West Indian lantana	Not-found	Shrubs	Herbaceous perennials	Least Concern
21	*Macrothelypteris torresiana*	Sword fern	Gaudich	Herbaceous	Perennial	Least Concern
22	*Mikania micrantha*	Climbing hempvine	Not-found	Herbaceous	Herbaceous perennials	Least Concern
23	*Mimosa pudica*	Touch-me-not	Not-found	Herbaceous	Annuals / Biennials	Least Concern
24	*Musa Spp.*	Banana tree	Kela	Herbaceous	Herbaceous perennials	Least Concern
25	*Parthenium hysterophorus*	Santa-maria feverfew	Not-found	Herbaceous	Annuals	Least Concern
26	*Plectrathus abboinicus*	Indian borage	khushila	Herbaceous	Perennial	Least Concern
27	*Pteridium spp.*	Fern	Uoniou	Herbaceous	Annuals	Least Concern
28	*Ricinus communis*	Castro bean plant	Not-found	Shrubs	Annuals	Least Concern
29	*Senecio vulgaria*	groundsel	Not found	Herbaceous	Annual	Least Concern
30	*Senna occcidentalis*	Coffee senna	Not found	Shrubs	Perennial	Least Concern
31	*Sida acuta*	Common wire-weed	Jaaru	Shrubs	Herbaceous perennials	Least Concern
31	*Solanum nigrum*	Black nightshade	Not-found	Herbaceous	Annuals / Biennials	Least Concern
33	*Solanum torvum*	Turkey berry	Khalanggi	Shrubs	Herbaceous perennials	Least Concern
34	*Solanum viarum*	Topical soda apple	Not-found	Herbaceous	Perennials	Least Concern
35	*Stellaria media*	Chickweed	Not-found	Herbaceous	Annuals / Herbaceous perennials	Least Concern
36	*Viburnum lantana*	Wayfarer	Not found	Herbaceous	Perennial	Least Concern

Table 6: New Flora (Herbs & Shrubs) Species recorded during the Fourth Terrestrial Survey

Flora (Herbs & Shrubs) diversity assessment of Zone A & B of PTDP (Fourth Terrestrial Survey))						
SN	**Scientific Name**	**English Name**	**Local Name**	**Types**	**Lifecycle**	**IUCN Status**
1	*Amaranthus retroflexus*	Red-root pigweed	Not found	shrubs	Annual	Least concern
2	*Cryptolepsisi buchanani*	Wax leaved climber	Langchu Rubjee	shrubs	Perennial	Least concern
3	*Woodfordia fruticosa*	Fire flame bush	Not found	shrubs	Evergreen shrubs	Least concern

Note : For the previous tabulations (**Table 5** and **Table 6**) the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred

Table 7 shows the total flora **(climbers, creepers, vine, and grass)** species recorded during the Second, Third and Fourth Terrestrial Survey. All the species highlighted are findings from the field study and not from the survey questionnaire and vice versa. The species are classified alphabetically based on their scientific name. The Local Name of each species is derivative to the *commonly known* basis, with preference given to the species name in Dzongkha (if available). The pictures of flora diversity recorded during the field study are attached as **appendix 5.** Pictures are not available for all the findings from the questionnaire survey.

Table 7: Flora (climbers, creepers, vine, and grass) species recorded during the Terrestrial Survey

Flora (climbers, creepers, vine, and grass) diversity assessment of Zone A & B of PTDP (First, Second, Third & Fourth Terrestrial Survey)						
SN	**Scientific Name**	**English Name**	**Local Name**	**Types**	**Lifecycle**	**IUCN Status**
1	*Bambuseae spp*	Bamboo	Basx	Grass	Perennial	Least Concern
2	*Cuscuta spp.*	Dodder	Not-Found	Creepers	Annual	Least Concern
3	*Luffa operculata*	Sponge Cucumber	Jaalo	Climbers	Annual	Least Concern
4	*Thysonolaena maxima*	Tiger Grass	Kucho	Grass	Perennial	Least Concern

Note: For the above tabulation (**Table 7**) the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred

5.2. Fauna Diversity

Table 8 shows the fauna species (Wild) recorded during the First, Second, Third and Fourth Terrestrial Surveys conducted. The species are classified alphabetically based on their scientific name. The Local Name of each species is derivative to the *commonly known* basis, with preference given to the species name in Dzongkha (if available), following by their native name. As fauna diversity was recorded based on survey questionnaires, only the names are available. It is also to be understood (as mentioned in the **Scope** of the report) that the fauna species listed below does not limit to or completely verify the present and absence of the species in Zone A and B. However, consultations with the Forest Range Office have been made for each of the findings listed below.

Table 8: Fauna species recorded during the Terrestrial Survey

Fauna diversity assessment of Zone A & B of PTDP				
SN	**Scientific name**	**Local Name**	**English name**	**IUCN Status**
1	*Bos gaurus*	Mithun	Indian Gaur*	Vulnerable
2	*Hystrix indica*	Jithur/Dumshi	Indian crested porcupine	Least concern
3	*Macaca mulatta*	Chea/Bandar	Common monkey	Least concern
4	*Muntiacusmuntjak*	Kasha/Goral	Barking Deer	Least concern
5	*Procyon lotor*	Not-Found	Raccoon	Least concern
6	*Sciurus niger*	Tortola/Lothorkay	Fox Squirrel	Least concern
7	*Sus Scrofa*	Repha/Boudel	Wild boar	Least concern

Note : The ones marked with (*) are migratory.
: For the above tabulation the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred

From the questionnaire survey conducted for the Fourth Terrestrial Survey, there were no mentions of any sightings of *Elephas maximus* i.e. the Asian Elephant. After confirming with the Forest Range Office, Asian Elephants have not been sighted at the project location for many years.

Table 9 shows the primary findings of domesticated species recorded during the First, Second, Third and the Fourth Terrestrial Survey. The species are classified alphabetically based on their scientific name. The Local Name of each species is derivative to the *commonly known* basis, with preference given to the species name in Dzongkha (if available) and followed by the native name. The following data was collected through field study and questionnaire survey. The pictures of following species are not attached as they are universally recognized and currently not endangered.

Table 9: Total domesticated species recorded

Domesticated animal diversity assessment of Zone A & B of PTDP			
SN	**Scientific Name**	**English Name**	**Local Name**
1	*Bos spp.*	Cattle	No / Guye
2	*Capra aegagrus*	Goat	Ra / Khashia
3	*Sus scrofadomesticus*	Pig	Phap / Sungur
4	*Gallus gallusdomesticus*	Chicken	Japay/Jaem /Kukhara
5	*Anas platyrhynchos domesticus*	Duck	Dhamja / Haas
7	*Felisdomesticus*	Cat	Gelee / Biralo
8	*Canislupasfamiliaries*	Dog	Rochee / Kukur
9	*Equus caballus*	Horse	Ta / Gora

Note: *Gallus gallusdomesticus* (Chicken) falls under Avifauna species but it is commonly raised as the domesticated animals; hence it has been included under 'domestic' and not under 'avifauna'

5.3. Avifauna Diversity

Table 10 shows the primary findings of Avifauna species recorded during the First, Second, Third and the Fourth Terrestrial Survey. The species are classified alphabetically based on their scientific name. The Local Name of each species is derivative to the *commonly known* basis, with preference given to the species name in Dzongkha (if available), following by the native name. Similar to the Fauna findings, it is to be understood (as mentioned in the **Scope** of the report) that the avifauna species listed below does not limit to or completely verify the presence or absence of the species in Zone A and B as the avifauna diversity as the data mentioned was recorded based on survey questionnaires (and so, no pictures are available). However, consultation with the Forest Range Office has been made for each of the findings listed below.

As the survey respondents were the same local households from the last survey conducted (Second Terrestrial Survey) the presence of the same Avifauna was listed.

Table 10: Avifauna species recorded during the Terrestrial Survey

Avifauna diversity assessment of Zone A & B of PTDP				
SN	**Scientific name**	**English name**	**Local names**	**IUCN status**
1	*Copsychussaularies*	Orientals Magpie Robin	Robin	Least concern
2	*Aceros nipalensis*	Ruffous-Necked Hornbill *	Jagobo	Vulnerable
3	*Acridotheresfuscus*	Jungle Myna	Teapjanap / Rupi	Least concern
4	*Alcedoatthis*	Common Kingfisher	Chuja	Least concern
5	*Aquila nipalensis*	Steppe Eagle*	Chhagay /Chil	Critically Endangered
6	*Athene brama*	Spotted Owlet	Wokthu / Kokolay	Least concern
7	*Bubulcus ibis*	Cattle Egret	Bakula	Least concern
8	*Columba livia*	Oriental Pigeon	Phutwo / Paraywa	Least concern
9	*Corvussplendens*	House Crow	Ola / Kaag	Least concern
10	*Haliaeetus leucoryphus*	Pallas's Fish Eagle	Chil	Endangered
11	*Hierococcyxvarius*	Common Hawk Cuckoo	Ja-a-khu	Least concern
12	*Hypsipetesleucocephalus*	Black Bulbul	Not-Found	Least concern
13	*Leiopicusauriceps*	Brown Fronted Woodpecker	Shingja	Least concern
14	*Myophonuscaeruleus*	Blue Whistling Thrush	Not-Found	Least concern
15	*Oxyurajamaicensis*	Reddy Duck	Dhamja / Haas	Least concern
16	*Passer cinnamomes*	Russet Sparrow	Nelzem	Least concern
17	*Pavocristatus*	Indian Peafowl *	Mujur	Least concern
18	*Phylloscopusxanthoschistos*	Grey-Hooded Warbler	Not-Found	Least concern
19	*Polyplectron*	Gray Peacock Pheasant *	Majapho	Least concern
20	*Psittaculacyanocephala*	Plum Headed Parakeet *	Not-Found	Least concern
21	*Spilopeliachinensis*	Spotted Dove	Thiligame/Dukur	Least concern
22	*Upupa epops*	Common Hoopoe	Daytokzem	Least concern

Note : The ones marked with (*) are migratory.
: For the above tabulation the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred
: It is to be noted that the avifauna species that are protected domestically and internationally are all migratory.

6. Inference from the Study Findings

Table 12, 13 and 14 is representative of the inferences drawn from the four Terrestrial Surveys conducted till date. The Summary of the Terrestrial Survey conducted is mentioned in **Table 11.**

Table 11: Summary of the Terrestrials Surveys conducted till date

SN	Terrestrial Survey	Study Focused on	Study period	Season
1.	First Terrestrial Survey	Density of species for the flora assessment and diversity of species for the avifauna and fauna	June – August 2019	Summer
2.	Second Terrestrial Survey	Diversity of species	September – November 2019	Autumn
3.	Third Terrestrial Survey	Diversity of species	December 2019 – January 2020	Winter
4.	Fourth Terrestrial Survey	Diversity of species	March – May 2020	Spring

6.1. Flora Species

6.1.1. Diversity of Trees during different seasons at Zone A & B and their buffer Zones

Table 12 is the representative of Tree species (noted during the four Terrestrial Surveys conducted till date) based on the presence and absence in the corresponding seasons. However, as the focused of the first terrestrial report was more on density than on diversity of species, it should be noted that the less count of species during the summer terrestrial report does not completely define the diversity of flora species during the season.

75% (21 tree species) of the Trees noted were Deciduous, 11% (3 tree species) semi-deciduous and 14% (4 tree species) were Evergreen species noted; these trees under goes through the process of leave abscission in a certain seasons. Therefore, **Table 12** is comparative of the leave abscission process of the following trees during the respective seasons.

Table 12: Seasonal changes (presence and absence) in Tree Species found in Zone A and B and their respective Buffer Zones

SN	Species	English Name	Seasons on which the Terrestrial Survey was conducted			
			SUMMER	AUTUMN	WINTER	SPRING
1	*Acacia catechu*	Khair	✓	✓	✓	✓
2	*Wrightia arborea*	Woolly Dying Rosebay				✓
3	*Albezia lebbeck*	Siris		✓	✓	✓
4	*Albizzia spp*	Flea tree		✓	✓	✓
5	*Alnus nepalensis*	Nepalese alder	✓			
6	*Allaeanthus grandies*	Not-found		✓	✓	✓
7	*Bauhinia purpurea*	Orchid tree		✓	✓	✓
8	*Brassiopsis hispida*	Phutta			✓	✓
9	*Bombax ceiba*	Cotton tree		✓	✓	✓
10	*Coriaria myrtifolia*	Redoul			✓	✓
11	*Carica papaya*	Papaya tree		✓	✓	✓
12	*Delonix elata*	White Gul mohur tree		✓	✓	✓
13	*Duabonnga grandiflora*	Hummingbird tree		✓	✓	✓
14	*Ficus auriculata*	Elephant ear fig		✓	✓	✓
15	*Ficus roxburgii*	Not-found		✓	✓	✓

16	*Ficus virens*	White fig		✓	✓	✓
17	*Gmelina aborea*	Beech-wood		✓	✓	✓
18	*Guruga pinnata*	Guruga		✓	✓	✓
19	*Moringa oleifere*	Drumstick tree		✓	✓	✓
20	*Morus microura*	King white mulberry	✓			
21	*Murraya koenigii*	Curry leaf tree		✓	✓	✓
22	*Premna latifolia*	Arani		✓	✓	✓
23	*Senegalia catechu*	Black catechu		✓	✓	✓
24	*Stereospermum tetragonum*	Snake tree		✓	✓	✓
25	*Steruculia sp.*	Not found	✓			
26	*Terminalia mycrocarpa*	Damson Plum	✓	✓	✓	✓
27	*Tetrameles nudiflora*	False hemp tree		✓	✓	✓
28	*Ziziphus jujube*	Jujube tree	✓	✓	✓	✓

Note : The one marked with tick (✓) shows the presence while the ones left blank represent the absence of the tree species.
: The highlighted one denotes the evergreen trees.

The presence of tree species were recorded high during the autumn, winter and spring while very few were noted in summer. It is to be understood (as mentioned in the **Scope** of the report) that the species listed above does not limit to or completely verify the presence or absence of the species in Zone A and B especially for the summer study as the species density was focused on rather than the diversity. Accordingly, the evergreen trees like *Albezia lebbeck* (Siris) and few more species highlighted in the **Table 12** were also not recorded during the summer due to above mentioned reasons.

6.1.2. Diversity of Herbs and Shrubs of Trees during different seasons at Zone A & B and their buffer Zones

Table 13 & 14 shows the occurrence of shrubs & herbs and creepers, grasses and climbers during the respective seasons. However, as the focused of the first terrestrial report was more on density than diversity of species, it should be noted that the less count of species during the summer terrestrial report does not completely define the diversity of flora species during the season.

The species mentioned, usually grows only in a particular growing season while during *off seasons*, species either die or remain in dormant phase; which could be one of the reason for the non-identification of some species.

Table 13: Occurrence of Herbs and Shrubs species in corresponding season in Zone A & B and its respective buffer zones

SN	Species	English Name	Types	Seasons on which the Terrestrial Survey was conducted			
				SUMMER	AUTUMN	WINTER	SPRING
1	*Acmella uliginosa*	Marsh papa cress	Herbaceous		✓	✓	✓
2	*Agerantum conyzoids*	Billygoat-weeds	Herbaceous		✓	✓	✓
3	*Alternanthera sessillis*	Sessiljoyweed	Herbaceous			✓	✓
4	*Amaranthus retroflexus*	Red-root pigweed	shrubs				✓
5	*Alysicarphus vaginalis*	White moneywort	Herbaceous		✓	✓	✓
6	*Arthemisia vulgaris*	Mugwort	Herbaceous		✓	✓	✓
7	*Ballota nigra*	Black horehound	Shrubs		✓	✓	✓
8	*Bidens pilosa*	Beggar-ticks	Herbaceous			✓	✓
9	*Chromolaena odorata*	Devil weed	Shrubs		✓	✓	✓
10	*Cinopodium vulgare*	Wild basil	Herbaceous		✓	✓	✓
11	*Coffea benghalensis*	Bengal coffea	Herbaceous			✓	
12	*Colebrookea*	Indian squirrel Tail	Herbaceous			✓	

SN	Species	English Name	Types	Seasons on which the Terrestrial Survey was conducted			
				SUMMER	AUTUMN	WINTER	SPRING
	oppositifolia						
13	*Colocasia esculenta*	Taro	Herbaceous		✓	✓	✓
14	*Crassocephalum crepidioides*	Redflower ragleaf	Shrubs		✓	✓	✓
15	*Crotalaria spectabilis*	Snowy rattlepod	Herbaceous		✓	✓	✓
16	*Cryptolepsis buchanani*	Wax leaved climber	shrubs				✓
17	*Erigeron bonariensis*	Flax leaved fleabane	Herbaceous		✓	✓	✓
18	*Erythrina aborescens*	Coral tree	Herbaceous			✓	
19	*Eupatorium odorantum*	Siam weed	Herbaceous		✓	✓	
20	*Grewia selurata*	Not found	shrubs	✓			
21	*Ipomoea nil*	Morning glory	Herbaceous		✓	✓	✓
22	*Lamium album*	White dead-nettle	Herbaceous		✓	✓	✓
23	*Lantana camara*	West Indian lantana	Shrubs	✓		✓	✓
24	*Macrothelypteris torresiana*	Sword fern	Herbaceous			✓	✓
25	*Mikania micrantha*	Climbing hempvine	Herbaceous	✓	✓	✓	✓
26	*Mimosa pudica*	Touch-me-not	Herbaceous		✓	✓	✓
27	*Musa Spp.*	Banana tree	Herbaceous		✓	✓	✓
28	*Parthenium hysterophorus*	Santa-maria feverfew	Herbaceous		✓	✓	✓
29	*Plectrathus abboinicus*	Indian borage	Herbaceous			✓	
30	*Pteridium spp.*	Fern	Herbaceous		✓	✓	✓
31	*Ricinus communis*	Castro bean plant	Shrubs		✓	✓	✓
32	*Senecio vulgaria*	Groundsel	Herbaceous			✓	✓
33	*Senna occcidentalis*	Coffee senna	Shrubs			✓	✓
34	*Sida acuta*	wire-weed	Shrubs		✓	✓	✓
35	*Solanum erianthum*	Mullein nightshade	Shrubs	✓			
36	*Solanum nigrum*	Black nightshade	Herbaceous		✓	✓	✓
37	*Solanum torvum*	Turkey berry	Shrubs		✓	✓	✓
38	*Solanum viarum*	Topical soda apple	Herbaceous		✓	✓	✓
39	*Stellaria media*	Chickweed	Herbaceous		✓	✓	✓
40	*Viburnum lantana*	Wayfarer	Herbaceous			✓	✓
41	*Woodfordia fruticosa*	Fire flame bush	shrubs				✓

Note: The one marked with tick (✓) shows the presence of species whiles the one left blank denotes the absence of species in a particular season.

Most Herbs and Shrubs found are a Perennial i.e. which grow and die in two consecutive season (spring and summer). Of the total 41 Shrubs and Herbs found in the study area, 36 species are found during winter (highest species count) and only 4 species were found during the summer season (lowest species count). However, the low count could be due to the study methodology adopted during the first terrestrial survey (summer), where the focused was only on density of species (Transect and Quadrant method).

6.1.3. Diversity of climbers, creepers and grasses during different seasons at Zone A & B and their buffer Zones

Table 14: Occurrence of Creeper, Grasses and Climbers in the corresponding season in Zone A & B and its respective buffer zones

SN	Species	English Name	Types	Life Cycle	Seasons on which the Terrestrial Survey was conducted			
					SUMMER	AUTUMN	WINTER	SPRING
1	*Bambuseae spp*	Bamboo	Grass	Perennial	✓	✓	✓	✓
2	*Cuscuta spp.*	Dodder	Creepers	Annual		✓	✓	✓
3	*Luffa operculata*	Sponge Cucumber	Climbers	Annual		✓	✓	✓
4	*Thysonolaena maxima*	Tiger Grass	Grass	Perennial		✓	✓	✓

Note : The one marked with tick (✓) shows the presence of species while one left blank denotes the absence of species in a given season.

6.2. Faunal diversity in different season in Zone A & B and their respective Buffer Zones

As there are no significant changes in the presence (or) absence of domestic faunal species i.e. the availability of these species are dependent on their herder or their *owner* and not on their migratory nature; therefore, the inference of diversity of domestic Fauna species is not discussed.

6.2.1. Diversity of fauna (wild mammal) in different season

Table 15 is representative of the findings from all the four terrestrial surveys conducted till date. Since some species changes their habitat with the change in seasons, the followings comparisons were noted:

Table 15: Faunal (mammals) species during the respective season

SN	Scientific Name	English Name	Seasons on which the Terrestrial Survey was conducted			
			SUMMER	AUTUMN	WINTER	SPRING
1	*Bos gaurus*	Indian Gaur*		✓	✓	✓
2	*Hystrixindica*	Indian crested porcupine		✓	✓	✓
3	*Macaca mulatta*	Common monkey		✓	✓	✓
4	*Muntiacus muntjak*	Barking Deer	✓	✓	✓	✓
5	*Procyon lotor*	Raccoon		✓	✓	✓
6	*Sciurus niger*	Fox Squirrel		✓	✓	✓
7	*Sus Scrofa*	Wild boar	✓	✓	✓	✓

Note : The one with tick (✓) represents the presence of faunal species while the one left blank represents the absence in a given season.
: The ones marked with (*) are migratory.

Almost all the fauna (wild mammals) were found in the three consecutive seasons (i.e. autumn, winter & spring) but there were only two species noted during the summer; this may be due to the lack of resources during the First Report.

As per the forest BEAT In-charge of Samtse, *Bosgaurus* (Indian Gaur) is migratory during winter season however as there were mentions of the mammal during the primary data collection (questionnaires from the locality), the fauna species was noted as present.

6.3. Diversity of Avifaunal species in different season in Zone A & B and their respective Buffer Zones

Table 16 is representative of the findings from all the four terrestrial surveys conducted till date. Since some species changes their habitat with the change in seasons, the followings comparisons were noted:

Table16: Avifaunal species during the respective Seasons

SN	Scientific Name	English Name	Seasons on which the Terrestrial Survey was conducted			
			SUMMER	AUTUMN	WINTER	SPRING
1	*Copsychussaularies*	Orientals Magpie Robin		✓	✓	✓
2	*Aceros nipalensis*	Ruffous-Necked Hornbill*		✓	✓	✓
3	*Acridotheresfuscus*	Jungle Myna		✓	✓	✓
4	*Ardea sp.*	Heron	✓			
5	*Ardea modesta*	Great heron	✓			
6	*Alcedoatthis*	Common Kingfisher		✓	✓	✓
7	*Aquila nipalensis*	Steppe Eagle*		✓	✓	
8	*Athene brama*	Spotted Owlet		✓	✓	✓
9	*Bubulcus ibis*	Cattle Egret	✓	✓	✓	✓
10	*Columba livia*	Oriental Pigeon	✓	✓	✓	✓
11	*Corvussplendens*	House Crow	✓	✓	✓	✓
12	*Haliaeetus leucoryphus*	Pallas's Fish Eagle		✓	✓	✓
13	*Hierococcyxvarius*	Common Hawk Cuckoo		✓	✓	✓
14	*Hypsipetesleucocephalus*	Black Bulbul		✓	✓	✓
15	*Leiopicusauriceps*	Brown Fronted Woodpecker		✓	✓	✓
16	*Myophonuscaeruleus*	Blue Whistling Thrush		✓	✓	✓
17	*Oxyurajamaicensis*	Reddy Duck		✓	✓	✓
18	*Passer cinnamomes*	Russet Sparrow	✓	✓	✓	✓
19	*Pavocristatus*	Indian Peafowl *		✓	✓	✓
20	*Phylloscopusxanthoschistos*	Grey-Hooded Warbler		✓	✓	✓
21	*Polyplectron*	Gray Peacock Pheasant *		✓	✓	✓
22	*Psittaculacyanocephala*	Plum Headed Parakeet *		✓	✓	
23	*Spilopeliachinensis*	Spotted Dove		✓	✓	✓
24	*Upupa epops*	Common Hoopoe		✓	✓	✓

Note : The one marked with tick (✓) denotes the presence of species while the one left blank shows the absence of a species in a given year. Since all the domesticated animals are presence throughout the seasons, they are tabulated here.
: The ones marked with (*) are migratory.

4 avifauna species were noted in the sampling site i.e. Zone A and B (inclusive of all buffer point along A and B) for the last four terrestrial surveys conducted.

Avifauna species like Cattle Egret, Pallas's Fish Eagle, Common Hawk Cuckoo and Grey-Hooded Warbler were marked as migratory in the last survey report (i.e. Second and the Third Terrestrial Survey). However, on reconfirming the migratory birds list with the Phuentsholing Range Office for the Fourth Terrestrial survey, these species were noted to be native and not migratory, therefore justifying our findings for the terrestrial surveys. Species inclusive of Cattle Egret, Pallas's Fish Eagle, Common Hawk Cuckoo and Russet Sparrow are all native to Phuentsholing; accordingly, these bird species are marked as present in all the Terrestrial Report conducted till date.

Species like the Ruffous-necked Hornbill, Indian Peafowl and Gray Peacock Pheasant are avifauna species that migrate during the winter as per the Phuentsholing Range Office however as per the questionnaire survey conducted there were mentions of the species and so are noted present in **Table 16.**

Plum Headed Parakeet and Steppe Eagle were two bird species that were noted to be absent during the Fourth Terrestrial Survey i.e. these bird species are migratory during the spring season as confirmed by the Phuentsholing Range Office.

7. Abundance of Species during different Seasons

Table 17 is representative of the respective species abundance recorded during the Four Terrestrial Surveys conducted still date.

Table 17: Showing the number of individual species in corresponding season

Type	Species	Seasons on which the Terrestrial Survey was conducted			
		Summer	Autumn	Winter	Spring
Flora	Trees	5	22	24	25
	Shrubs and Herbs	4	26	36	39
	Climber, creepers and grasses	1	4	4	4
Fauna	Wild mammals	4	7	7	8
	Domestic animals	4	8	8	8
Avifauna		6	22	22	22

It is found that there is a Seasonal variation in the abundance of flora, fauna and avifauna in the sampling site, zone A and B (also along the buffer point of each zone). Maximum abundance of species (inclusive of Flora, Fauna and Avifauna) was noted to be during spring and winter and so, species richness is recorded high in spring followed by winter. Such species abundance could be due to the moderate and cool climatic condition during these seasons which therefore, provide a favorable habitat of many species. Less number of species were recorded in summer however as the first terrestrial report (summer season) focused s on density of species one cannot give much confidence on the diversity listed during the Summer Study.

The dominant species found throughout the season are shrubs and herbs. Shrubs and Herbs species are found in high numbers in all season while climbers, creepers and grasses are found less dominance throughout the season. A total of 68 flora species, 16 fauna species (adding both domestic and wild species) and 22 Avifauna species were noted during the four consecutive terrestrial surveys carried out from the month of June 2019 to May 2020. As mentioned in the scope, the species abundance in Zone A and B (and along their respective Buffer Zones) are not limited to the ones noted in the series of Terrestrial Survey conducted till date; there may be additional species that may have been present but have not been noted due to physical, technical and samplers error.

8. CONCLUSION

The Fourth Terrestrial Survey Report is a collective of Terrestrial Survey data conducted from March 2020 – May 2020. Additionally, this report is comparative to the findings from the First, Second and Third Terrestrial Survey. The study records the diversity of flora, fauna and avifauna species. Primary and Secondary data were collected for the study. For primary data, survey questionnaire and site surveys were conducted. Field surveys were done by using android applications on the recommendation from the Forest Range Office, Phuentsholing. The survey questionnaires were asked to the local households for additional information on flora, fauna and avifauna diversity. For secondary data, information from publications, international web sites and the EIA for Amochhu 2017 were referred.

During the Fourth Survey conducted, a new tree species i.e. *Wrightia arborea* commonly known as Woolly Dying Rosebay was noted. Woolly Dying Rosebay is a deciduous tree and shed their leaves annually; the non-identification of the species during the previous Terrestrial Surveys could be due to the examiner/ surveyor error.

Additionally, three new shrubs species were also identified during the Fourth Terrestrial Survey. Shrub species like *Cryptolepsisi buchanani* and *Amaranthus retroflexus* shed annually and perennially (respectively) and so, the previous non-identification of these species could be due to their shedding. *Woodfordia fruticosa* is an evergreen shrub, therefore the non –identification of the plant could be due to the examiner/ surveyor error while sampling.

Ruffous-Necked Hornbill (*Acerosnipalensis sp)* is also marked as "protected" as per FNCR 1995. However, the protected Avifauna species are migratory which why they do not have its habitat at the Ammochhu for an extended period. Similar findings were noted from the last Terrestrial Surveys Questionnaires as there are only a limited number of local households in zone A and B which results in the survey of the same group of people each season.

In brief, during the survey four additional flora species which were not identified during the first, Second and Third Terrestrial Survey was noted. None of these new flora species recorded are threatened as per IUCN red list or the FNCR 1995 and 2017. Similar to the last Terrestrial Survey findings, the dominant species remain to be Khair (*Acacia catechu*), devil weed (*Chromolaena odorata*) West Indian lantana (*Lantana camara*) and common wire-weed (*Sida acuta*) within the site (relative to their shedding cycle). No new species of Fauna or Avifauna were noted. Many of the species identified were recorded from Zone B due to denser vegetation cover in comparison to Zone A. The above recorded species are not disturbed or threatened by the current township development project.

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*Note: APA reference style is followed.

APPENDIX 1: List of Persons involved

Table 11: List of people involved during the Fourth terrestrial survey.

SN	Names	Designation	Organization
1	Mr. Pemchung	Environmental Manager	Construction Development Corporation Limited
2	Ms. Sonam Deki	Environmentalist	Gyeltshan Consultancy
3	Mr. Ashok Kumar	HSE-In Charge	AFCONS Infrastructure Limited
4	Mr. Sunny	Environmental Engineer	AFCONS Infrastructure Limited
5	Ms. Kinley Yangzom	Jr. Environmental Officer	AFCONS Infrastructure Limited
6	Mr. Yeshi Tenzin	Quality Manager	Bhutan Ecolab Services
7	Ms. Tendey Pema	Environmental Officer	Bhutan Ecolab Services
8	Ms. Tshering Zangmo	Staff	Bhutan Ecolab Services
9	Mr. Tek Bdr Ghallay	Staff	Bhutan Ecolab Services
10	Mr. Rinzin Tempa	Staff (Dip. Forestry)	Bhutan Ecolab Services

APPENDIX 2: The mobile/android application used during the survey

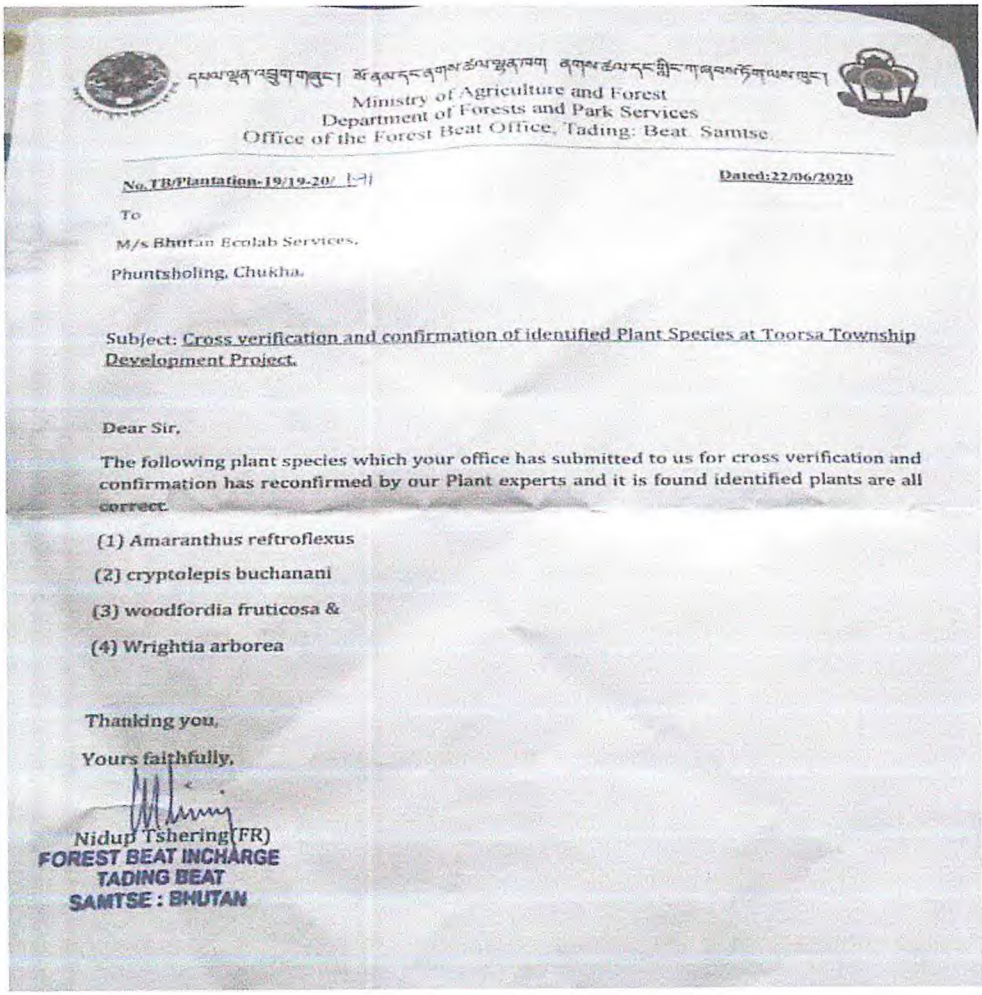
An android application used during the field survey for the identification of flora species as recommended by the Forest Officials from Forest Range Office, Phuentsholing.

Name :Leafspot-plant identification
Version : 1.0
Updated on: January 2, 2019
Offered by :Mobiwhiz

Name : Plantifier
Version : 2.4.2
Updated on: October 29, 2018
Offered by : Gekiere.com

APPENDIX 3: Letter of Verification for the New Flora Species found

Following attachment shows the cross-checked and verified Terrestrial species by the Gedu Forest Division.



Ministry of Agriculture and Forest
Department of Forests and Park Services
Office of the Forest Beat Office, Tading: Beat. Samtse

No.TB/Plantation-19/19-20/ 171 Dated:22/06/2020

To

M/s Bhutan Ecolab Services,

Phuntsholing, Chukha.

Subject: Cross verification and confirmation of identified Plant Species at Toorsa Township Development Project.

Dear Sir,

The following plant species which your office has submitted to us for cross verification and confirmation has reconfirmed by our Plant experts and it is found identified plants are all correct.

(1) Amaranthus reftroflexus

(2) cryptolepis buchanani

(3) woodfordia fruticosa &

(4) Wrightia arborea

Thanking you,

Yours faithfully,

Nidup Tshering(FR)
FOREST BEAT INCHARGE
TADING BEAT
SAMTSE : BHUTAN

APPENDIX 4: Questionnaires for locals and forest officials

Questionnaires for the locals: Assessment of Diversity of Plants, Animals and Birds at Phuentsholing Township Development Project.

A. Survey form for assessment of flora diversity

1) What plant species are found at your locality?
2) Do you know that some plants are protected by laws internationally and in Bhutan?
   a) Yes
   b) No
3) If yes, what are the local names for those plants?
4) Do you take measures to protect those plants?
   a) Yes
   b) No
5) If yes, what measures did you take to protect those species of plants?

Survey form for assessment of Mammals and Birds diversity

1) What mammals and birds are seen in your locality?
2) Do you find some mammals and birds at certain season only?
   a) Yes
   b) No
3) If yes, can you please tell us how long do you see them and at which season?
4) Did you know that some mammals and birds are protected by law internationally and by the Royal Government of Bhutan?
   a) Yes
   b) No
5) If yes, do you recognize those protected mammals and birds?
   a) Yes
   b) No
6) If yes, what are the local name for those mammals and birds?
7) Do you take measures to protect those mammals and birds?
   a) Yes
   b) No
8) If yes, what measures did you take to protect those species of mammals and birds?

Questionnaires for Forest Officials: Assessment of diversity of Plants, Animals and Birds at Phuentsholing Township Development Project.

1. Did the Forest Department document the species of plants, animals and birds along the Toorsa River?
    a. Yes
    b. No
2. If yes, what were the species of plants, animals and birds documented?
3. Do you find any species of plants, animals and birds which are of concern along the Toorsa River?
    a. Yes
    b. No
4. If yes, what are the species of plants, animals and birds which are of concern that you find along the Toorsa River?

APPENDIX 5: PLANT SPECIES RECORDED DURING THE SECOND AND THE FOURTH TERRESTRIAL SURVEY.

1.Trees:

Scientific Name: *Acacia Catachu*
Common Name: Khair

Scientific Name: Albizzia lebbeck
Common Name: Siris

Scientific Name: *Albizzia spp*
Common Name: Flea tree

Scientific Name: *Allaeanthus grandies*
Common Name: Not found

Scientific Name: *Bauhinia purpurea*
Common Name: Cotton tree

Scientific Name: *Bombax ceiba*
Common Name: Orchid tree

Scientific Name: *Carica papaya*
Common Name: Papaya tree

Scientific Name: *Delonix elata*
Common Name: Gul mohur tree

Scientific Name: Duabonnga grandiflora
Common Name: Hummingbird tree

Scientific Name: *Ficus auriculata*
Common Name: Elephant ear fig

Scientific Name: *Ficus virens*
Common Name: White fig

Scientific Name: *Gmelina arborea*
Common Name: Beech wood/gamhar

Scientific Name: *Murraya koenigii*
Common Name: Curry leaf tree

Scientific Name: *Moringa oleifere*
Common Name: Drumstick tree

Scientific Name: *Premna latifolla*
Common Name: Arani

Scientific Name: *Senegalia catechu*
Common Name: Black catechu

scientific Name: Stereospermum tetragonum
Common Name: Snake tree

Scientific Name: Terminalia microcarpa
Common Name: Damson plum

Scientific Name: *Tetrameles nudiflora*
Common Name: False hemp tree

Scientific Name: *Ziziphus jujube*
Common Name: jujube tree

2. Herbaceous and Shrubs

Scientific Name: *Acmella uliginosa*
Common Name: Marsh para cress

Scientific Name: *Ageratum Conyzoids*
Common Name: Billygoat-weed

Scientific Name: Alysicarphus vaginalis
Common Name: White moneywort

Scientific Name: Arthemisia vulgaris
Common Name: Mugwort

Scientific Name: Ballota nigra
Common Name: Black horehound

Scientific Name: Bidens pilosa
Common Name: Beggar-ticks

Scientific Name: *Chromolaena odorata*
Common Name: Devil weed

Scientific Name: *Cinopodium vulgare*
Common Name: wild basil

Scientific Name: *Colocasia esculenta*
Common Name: Taro

Scientific Name: *Crassocephalum crepidioides*
Common Name: Redflower ragleaf/ fireweed

Scientific Name: *Crotalaria Spectabilis*
Common Name: Snowy rattlepod

Scientific Name: *Erigeron bonariensis*
Common Name: Flax leaved fleabane

Scientific Name: *Ipomoea nil*
Common Name: Morning glory

Scientific Name: *Lamium album*
Common Name: White dead-nettle

Scientific Name: *Lantana camara*
Common Name: West Indian Lantana

Scientific Name: *Mikania micrantha*
Common Name: Climbing hempvine

Scientific Name: *Mimosa pudica*
Common Name: Touch-me-not

Scientific Name: *Musa spp*
Common Name: Banana

Scientific Name: Parthenium Hysterophorus
Common Name: Santa-maria feverfew

Scientific Name: Ricinus communis
Common Name: Castro bean plant

Scientific Name: *Sida acuta*
Common Name: Common Wire-weed

Scientific Name: *Solanum nigrum*
Common Name: Black nightshade

Scientific Name: *Solanum torvum*
Common Name: Turkey berry

Scientific Name: *Solanum viarum*
Common Name: Topical soda apple

Scientific Name: *Stellaria media*
Common Name: Chickweed

3. Climbers, creepers and grasses

Scientific Name: *Bambuseae spp*
Common Name: Bamboo

Scientific Name: *Cuscuta spp*
Common Name: Dodder

Scientific Name: *luffa operculata*
Common Name: Sponge cucumber

Scientific Name: *Thysonolaena*
Common Name: Tiger grass

4. Additional species found during the Fourth Terrestrial Survey

Scientific Name: Amaranthus retroflexus
Common Name: Red-root pigweed

Scientific Name: *Cryptolepsis buchanani*
Common Name: Wax leaved climber

Scientific Name: *woodfordia fruticosa*
English Name: Fire flame bush bay

Scientific Name: *Wrightia arborea*
English Name: Woolly Dying Rose

APPENDIX 6: Photographs taken during the Terrestrial Survey Questionnaire

Appendix 19

Second Pre-Monsoon Aquatic Study Report

On Aquatic Survey along Amochhu River Basin Phuentsholing-Chukha

26th March-27th March 2020
Bhutan Ecolab Services
Phuentsholing

BHUTAN ECOLAB SERVICES

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GLOSSARY

C

1) **Critically Endangered (CN):** A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
2) **Cypriniformis:** Is an order of ray finned fish which possess weberian apparatus. They possess only a dorsal fin in its back unlike other order.

D

3) **Data Deficient (DD):** A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

E

4) **Electro-Fishing Efficiency:** How effective the use of electro-fishing is.
5) **Endangered (EN):** A taxon is endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

G

6) **Galvan taxis:** Response of fish to the electric current.

L

7) **Least Concern (LC):** A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

N

8) **Not Assessed:** A taxon is Not Evaluated or Not Assessed when it is has not yet been evaluated against the criteria.
9) **Near Threatened (NT):** A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

O

10) **Osteichthyes:** Popularly referred as bony fish, is a diverse taxonomic group of fish that have skeletons primary composed of bone tissue as opposed to cartilage.

P

11) **Perciformes:** Fish in this order have the dorsal and anal fins divided into anterior spiny and posterior soft rayed which may be partially or completely separated.

S

12) **Synbranchiformes:** Often called swamp eels are an order of ray finned fishes that are like eel but have spiny rays.

13) **Species not determined:** A taxon is Species not determined when it has been evaluated against the criteria and does not qualify under any recognized species.

V

14) **Vulnerable (VU):** A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

ABBREVIATION

1)	**CDCL**	:	Construction Development Corporation Limited
2)	**CEMP**	:	Contractors Environmental Management Plan
3)	**DC**	:	Direct Current
4)	**EIA**	:	Environmental Impact Assessment
5)	**FNCR**	:	Forest and Nature Conservation Regulation
6)	**IUCN**	:	International Union for Conservation of Nature
7)	**NRCR&LF**	:	National Research Centre for Riverine & Lake Fisheries
8)	**ADB**	:	Asian Development Bank
9)	**BES**	:	Bhutan Ecolab Services
10)	**PTDP**	:	Phuentsholing Township Development Project

BHUTAN ECOLAB SERVICES PHUENTSHOLING

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1. Introduction:

Phuentsholing is located adjacent to the Bhutan and the Indian border and so, is tagged as the "economic capital" (Amochhu EIA Report, 2017) for Bhutan. In the recent years, Phuentsholing has face the problem of increasing population with limited area (Amochhu EIA Report, 2017); adding to this, the Amochhu River threatens to flood, erode and cause loss of valuable land resulting in sedimentation at lower ends of the river. Hence so, Phuentsholing Township Development Project, contracted to AFCONS Infrastructure Limited by CDCL with their consultant as Egis International is working on the Construction of River Training and Embankment Work along the Amochhu River. In the course of the construction works, it is crucial to monitor and maintain the ecological health i.e. Terrestrial and Aquatic environment within and the areas adjacent to the project site.

The Aquatic Survey Reports study the fish composition and observe the diversity variability during different seasons and the mobility behavior of critically endangered fish like Golden Mahseer (Ammo Chhu River is the migratory Route for the Golden Mahseer). This report i.e. the Third Aquatic Study (and the Second Pre-monsoon study) will be comparative to the last Pre-monsoon and Post monsoon Aquatic studies (First & Second Aquatic survey respectively) conducted.

According to the information shared by residents, the natural river flow and water ways are under continuous disturbance due to dredging, surface boulders/sand collection and operation of stone crushing Plants by non PTDP relative private parties in the study area. However, during the Third Aquatic Study, the surface boulder and sand collections activity were absent along the river but two crushing Plants were observed in Zone A site.

The Second Pre-monsoon Aquatic Survey (i.e. Third Aquatic Survey conducted) was carried out on 26th and 27thMarch 2020. The study was conducted with the assistance of a team of fishery experts from the NRCR&LF, Haa (**Appendix 2**) under the Department of Livestock, Ministry of Agriculture and Forests. An approval from the Department of Forest for the study is attached as **Appendix 3**. With respect to the objectives listed in **section 3** of this report, our primary focus remains to noted the presence and absence of the protected fish species Golden Mahseer which is marked as endangered in the IUCN Red list

Therefore, this report provides fish species diversity in different seasons along the Ammo Chhu basin falling within the Phuntsholing Township Development Project executed by M/s Afcons Infrastructure Ltd. The data thus recorded will serve as baseline data for future studies and development of conservation program to minimize major impacts on Ammo Chhu aquatic ecosystem from project activity.

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1.2 Golden Mahseer

Among the fish species that are being studied, the Himalayan Golden Mahseer (*Tor putitora*) is an endangered species having their migrant habitat in the Ammochhu River. Generally, Golden Mahseer inhabits both rivers and lakes, with most species found in fast-flowing rivers/streams with rocky bottoms for breeding. Morphologically, its caudal, pelvic and anal fins show a tint of reddish-golden colour. While the body above its lateral lines is generally golden in color adulthood, the gold colour might be absent in juvenile. They are omnivorous and so prey on algae species, crustaceans, insects, frogs, other smaller fishes and also fruits that fall from overhead.

Tor putitora is the largest member of its group and is one of the largest cyprinids that grow to 2.75 meters and 54 kilograms in weight. The juveniles are mostly found near the large and small boulders, where water is free-flowing and well oxygenated. Among the golden Mahseer, Himalayan Mahseer, *Tor putitora,* is an endangered species of cyprinid fish that is found in rapid streams, Riverine pools and lakes in the Himalayan region and southern Asia.

The species is threatened mainly due to habitat loss, habitat degradation and overfishing. According to research, its population has been declined drastically to more than 50 % as of today.

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2. Objective

1. To study and assess the fish species composition (diversity) along the Amochhu River basin that fall under the Phuentsholing Township Development Project (PTDP);
2. Establish baseline data for fish composition
3. Assess presence of protected fish species primarily focusing on Golden Mahseer i.e. marked as endangered in the IUCN Red list.
4. To study, compare and analyze the data collected thus far.

3. Study Area Description:

Study sites were based on the EIA report for Phuentsholing Township Development Project in accordance with the CEMP. The sampling stations allow for the even distribution of the sampling areas to obtain unbiased samples. Sampling stations were divided as follows:

i The main **Amochhu:** With six sampling stations, which starts from Indo-Bhutan border till the Purbay Bridge (Phuentsholing - Samtse High Way Bridge);

ii The **Omchhu:** Commonly known as Dortikhola with two stations, starts from Amochhu - Omchhu Confluence till Crocodile farm;

iii The **Lawrichhu:** Falls under Samtse Dzongkhag, is also covered as one of the fish sampling station

iv The **Hawri khola:** Two stations starting from Ammochhu-Hawri khola confluence and upstream. However, the sampling from the location could not be taken as the river bed had completely dried up during the survey **(Figure 2).**

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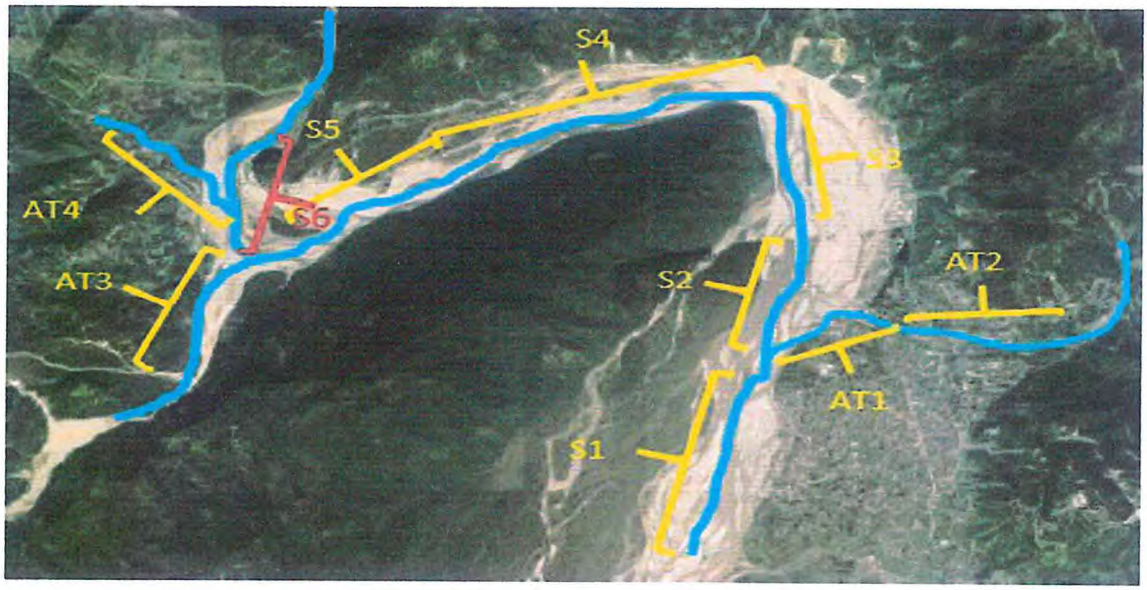

Figure 1: Geographical outlay of survey sites.

Figure 2: Dried up River bed of Hawri khola (AT3)

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The GPS coordinates of all sampling sites is shown in **Table 1.**

Table 1: Details of Sample station with GPS Coordinates

Station	Location	Coordinates		Altitude (m)	Remarks
		Start Points	End Points		
S1	Amochhu- Below Amochhu-Omchhu confluence	N26.86323 E089.36226	N26.86805 E089.37244	182	Indo-Bhutan Border
S2	Amochhu- Above Omchhu-Amochhu confluence	N26.86805 E089.37244	N26.87709 E089.37215	189	Development
S3	Amochhu-Main Construction Site	N26.87709 E089.37215	N26.88541 E089.37103	199	Main Office Area
S4	Amochhu- Above Wangchunye (Shiv Mandir)	N26.88541 E089.37103	N26.88544 E089.36548	200	Development Site
S5	Amochhu-Below Lawrichhu-Amochhu Confluence	N26.87501 E089.97103	N26.88544 E089.33882	245	Development Site
S6	Amochhu-Below Confluence	N26.87501, E089.33882	N26.88629 E89.33504	257	Development Site
AT1	Amochhu-Omchhu Confluence	N26.86805 E089.3724	N26.86719 E089.77475	183	Below Samtse Highway Bridge
AT2	Omchhu-Crocodile Farm to new high way bridge	N26.86719 E089.77475	N26.86381 E89.39029	217	Dortikhola
AT3	Howrai khola	Tributary had dried up			
AT4	Loawrichhu-Amochhu confluence to below Tanding gup Office Samtse	N26.87501 E089.33882	N26.87808 E089.32619	222	Tanding gewog, Samtse

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4. Methods & Methodology:

The catch and release approach was adopted at all the sampling points. The fishes were caught using Electro-Fisher device (12 volt battery operated electro-shocker) by pulsing DC current into the water; this temporarily immobilizes the fish & dip net is used to catch the fish. Generally, 12 Volts of electric current is pulsed into the water for approximately 1 to 3 seconds at various points along the sampling sites. Each fish caught is placed inside the transparent Photarium and photographed using high DSLR camera before releasing back into the river. **Figure 3** is representative of the field survey conducted.

4.1 How Electro-fishing Works

An Electro-fisher was used during the survey for sampling the fish species. The backpacked electro-fisher (Electro-Shocker) powered by petrol generator, equipped with positive and negative probe extended electrodes (Anode & Cathode) were used to pulse DC into the water.

DC is more effective & less traumatic on the fishes (Lamarque, 1990) and so, was preferred and recommended for the study. The use of the Electro-Shocker interrupts the neurological pathways of the fish (galvano taxis), causing the fish to move towards the anode. The operator walks with the electro fisher unit, holding a pole-mounted anode and trailing a cathode to shock the fishes. Following the operator is a netter with dip net to capture the immobilized fishes. That is, the density of electric field increases as the fish swims towards the anode which then leaves them temporarily immobilized (Lamarque, 1990&Lamarque et al., 1971) thus making the sampling possible.

Survey with Electro-Shocker is feasible in habitats where the operators can safely walk in the river. However, the wading becomes dangerous at depths greater than 0.5 m, as it increases the chances of operator getting shocked as the operators have to use the pole under water at greater depth (Hickley, 1990).

Electro-Fishing efficiency is lower in larger streams as the fishes can avoid the electric current (Paller, 1995) and so, surveying in smaller stream is advised. However, fishes can be captured in wider streams by using multiple electro-fishing units or multiple anodes (Bayley et al., 1989). Turbidity of the water also affects the catch rate of the fishes. Catch rates are highest in intermediate turbidities because when the turbidity is low, fishes notice the operator sooner and can thus flee, while at high turbidity netters cannot see the immobilized fishes(Reynolds, 1983).

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Figure 3: Fish sampling using battery operated electro-shocker

4.2 List of Materials used during survey:

1. 12 volt battery operated electro-shocker fitted with positive and negative probe to pulse the current into the water.
2. Portable dip net
3. Polyester open bags to store fish safely
4. DSLR Camera
5. Garmin GPS
6. Photarium
7. Portable handheld multi-parameter water quality testing device
8. Cloth pieces
9. Pens & pencils
10. Field data sheets.

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5. Findings:

During the study, the basic water quality parameters such as the concentration of dissolved oxygen, temperature, & pH were subsequently measured to detect the quality of water, thermal variability and adaptability of fishes in each sampling station. Detail of the basic water parameter is given in **Table 2.**

Table 2: Basic Water Parameters Data for each sampling Location

Stations	Location Name	Temperature (°C)	pH	Dissolved Oxygen (mg/L)
S1	Amochhu –below Amochhu –Amochhu confluence	18.2	7.7	9.83
S2	Amochhu- Above Omchhu – Amochhu confluence	20.5	7.9	10.7
S3	Amochhu-Main Construction site	18.8	7.7	9.97
S4	Amochhu-Above Wangchhunye (Shiv Mandir)	17.9	7.7	9.37
S5	Amochhu-above Wangchhunye (Shiv Mandir)	18.9	7.6	10.9
S6	Amochhu-Below Loawrichhu-Amochhu Confluence	16.9	7.9	10.7
AT1	Amochhu-Amochhu confluence to crocodile farm	20.7	-	-
AT2	Omchhu-crocodile farm to new high way bridge	20	7.9	9.12
AT3	Howrai khola	Tributary had Dried Up		
AT4	Lawrichhu-Amochhu confluence to below Tanding gup office Samtse	16.9	7.6	12.8

5.1 Phytoplankton:

These are the microscopic algae that float and inhabit the upper layer of most freshwater and marine environment. The concentration/ presence of Phytoplankton are reflective on the color and clarity of lakes, wetlands, rivers, streams and estuaries. They are the primary producers in aquatic ecosystems as they are the food sources for higher order organisms such as zooplankton and small fishes. During the survey, phytoplankton species were found on the beds of the river at a very scare and infrequent habitations; this may be the case due to the recurrent erosion and sedimentation along the river banks.

5.2 Zooplanktons:

Zooplanktons are heterotrophic (detrivores) microscopic organisms found both in freshwater and marine ecosystem. They also serve as food source for fishes. However, respective to the fish survey technique used the identification of zooplanktons was not noted; this however does not mean the absence of zooplanktons in the Amochhu River.

5.3 Benthos:

Are the organism that thrive on, in or near the seabed, riverbed or at the bottom of lakes i.e. mostly in the sedimentary environment of a water body. During the survey, benthic species were not caught as the mesh of the nets may have been too large to catch benthic organism; this however, does not conclude the presence or the absence of benthic organism in the Amochhu River or its tributaries and therefore recommend for an explicit study to be conducted.

5.4 Fishes

During the survey, a total of 27 osteichthyic fishes belonging to three orders, eleven families and twenty genera were found. The status of the fish species caught during the survey has been referred from IUCN and is represented in the table below (**Table 3, 4 & 5**).

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5.4.1 Classification of Fish Species found in Second Pre-Monsoon Aquatic Survey based on their Order with IUCN Status

Note: For the tabulations (**Table 3, 4 & 5**) the Forest and Nature Conservation Act and Regulation 1995 and 2017 have been referred.

Table3: List of Fish Species belonging to Order *Cypriniformis* respective to their Family

Name of the species	IUCN Red List Status	Last Assessed by IUCN
I). Family *Cyprinidae*		
1. *Bariliusbarna*	Least Concern	19/03/2011
2. *Bariliusbendelisis*	Least Concern	22/01/2010
3. *Bariliusvagra*	Least Concern	22/01/2010
4. *Crossocheiluslatius*	Least Concern	09/10/2009
5. *Garra annandalei*	Least Concern	09/10/2009
6. *Garra gotyla*	Least Concern	07/10/2009
7. *Neolissochilus hexagonolepis*	Near threaten	09/10/2009
8. *Neolissochilus dukai*	Data deficient	01/03/2010
9. *Pethia ticto*	Least Concern	22/03/2010
10. *Schizothorax progastus*	Least Concern	11/05/2010
11. *Schizothorax richardsonii*	Vulnerable	14/06/2010
12. *Tor putitora*	Endangered	10/09/2019
II). Family *Psilorhynchidae*		
13. *Psilorhynchus balitora*	Least Concern	23/02/2010
III). Family *Balitoridae*		
14. *Aborichthys sp.*	Least Concern	Species not determined
IV). Family *Amblycipitidae*		
15. *Amblyceps apangi*	Least Concern	16/12/2009
16. *Amblyceps cerinum*	Least Concern	Not Assessed
V). Family *Sisoridae*		
17. *Glyptothorax sp.*	Least Concern	Species notdetermined
18. *Glyptothorax panda*	Least Concern	09/04/2010
VI). Family Cobitidae		
19. *Lepidocephalichthys guntea*	Least Concern	Species not determined
VII). Family Nemacheilidae		
20. *Schistura beavani*	Least Concern	Species not determined
21. *Paracanthoscobitisab utwebi*	Least Concern	Not Assessed
22. *Schistura reticulo fasciata*	Least Concern	Not Assessed

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Table 4: List of Fish Species belonging to Order *Perciformes* under respective to their Family

Name of the species	IUCN Red List Status	Last Assessed by IUCN
VIII)Family *Channidae*		
23. *Channa punctatus*	Least Concern	Not Assessed
24. *Channa gachua*	Least Concern	Not Assessed
IX)Family *Badidae*		
25. *Badis badis*	Least Concern	10/03/2010

Table 5: List of Fish Species belonging to Order *Siluriformes* respective to Family

Name of the species	IUCN Red List Status	Last Assessed by IUCN
X)Family *Bagridae*		
26. Olyra longicaudata	Least Concern	Not Assessed
XI)Family *Sisoridae*		
27. Pseudo chenesis	Least Concern	Not Assessed

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5.4.2 Fishes caught at each Sampling Sites during the Second Pre-monsoon Aquatic Survey

Table 6: Stations with Fish Species Distribution

Station	Location	*Fish Species*
S1	Amochhu – below Amochhu – Amochhu confluence	*Barilius barna, Barilius bendelisis, Bariliusvagra, Crossocheiluslatiu Garra annandalei, Garra gotyla, Neolissochilus hexagonolepis, Schizothorax progastus, Schizothorax richardsonii, Psilorhynchus balitora, Aborichthy ssp. Amblycepsapangi, Glyptothorax sp. Glyptothorax panda, Schisturasp. Channa gachua, Channa punctatus, Badis Badis, Schisturadevdevi, Schistura reticulo fasciata*
S2	Amochhu- Above Omchhu – Amochhu confluence	*Barilius barna, Barilius bendelisis, Crossocheiluslatius, Garra annandalei, Garra gotyla, Neolissochilus hexagonolepis, Schizothorax progastus, Psilorhynchusbalitora, Aborichthys sp. Amblycepscerinum, Glyptothorax sp.Glyptothorax panda, Schisturasp.BadisBadis, Lepidocephalichthysguntea, Schisturadevdevi, Schisturareticulofasciata*
S3	Amochhu-Main Construction site	*Bariliusbarna,Bariliusbendelisis, Bariliusvagra, Garraannandalei, Garragotyla, Neolissochilushexagonolepis,Neolissochilusdukai, Pethiaticto, Schizothoraxprogastus, Schizothoraxrichardsonii, Psilorhynchusbalitora, Aborichthys sp. Glyptothoraxsp.Glyptothorax panda, Schisturasp.Channagachua, Channa ,punctatus,BadisBadis, Olyralongicaudata, Lepidocephalichthysguntea, Schisturadevdevi, Schisturareticulofasciata.*
S4	Amochhu-Above Wangchunye (Shiv Mandir)	*Barilius barna,Barilius bendelisis, Bariliusvagra, Crossocheiluslatius, Garra annandalei, Garragotyla, Neolissochilus hexagonolepis , Pethiaticto, Schizothorax progastus, Schizothoraxrichardsonii, Psilorhynchusbalitora, Aborichthyssp.Amblycepsapangi, Amblycepscerinum, Schisturadevdevi, Schistura reticulo fasciata, Glyptothorax sp.Glyptothorax panda, Schisturasp.Channagachua, Channapunctatus,BadisBadis, Olyralongicaudata ,Lepidocephalichthysguntea. Paracanthocobitisabutwebi ,*
S5	Amochhu-above Wangchunye (Shiv Mandir)	*Bariliusbendelisis, Bariliusvagra, Garraannandalei, Garragotyla, Neolissochilus hexagonolepis, Schizothorax progastus, Schizothoraxrichardsonii, Schisturadevdevi, Schisturareticulofasciata,Psilorhynchusbalitora, Aborichthyssp.Amblycepsapangi, Amblycepscerinum, Glyptothoraxsp.Glyptothorax panda,.Channagachua, Channapunctatus,BadisBadis, Olyralongicaudata, Lepidocephalichthysguntea, Pseudochenesissulcatus*
S6	Amochhu Below Loawrichhu-Amochhu Confluence	*Bariliusbarna,Bariliusbendelisis, Bariliusvagra, Garraannandalei, Garragotyla, Neolissochilushexagonolepis, Schizothoraxprogastus, Aborichthyssp., BadisBadis, Lepidocephalichthysguntea, Schisturadevdevi, Schisturareticulofasciata*
AT1	Amochhu-Omchhu confluence to below highway bridge.	Not able to access the fish sampling site due to water training activities
AT2	Omchhu-Crocodile farm to new high way bridge	*Bariliusbarna, Garra annandalei, Garra gotyla, Neolissochilus hexagonolepis, Neolissochi lusdukai, Psilorhynchusbalitora, Aborichthyssp. Lepidocephalichthysguntea, Paracanthocobitisabutwebi, Schisturadevdevi, Schisturareticulofasciata*
AT4	Loawrichhu	*Bariliusbarna, Bariliusvagra, Garraannandalei, Garragotyla, Neolissochilushexagonolepis, Schizothoraxprogastus, Aborichthyssp.Lepidocephalichthysguntea, Schisturadevdevi, Schisturareticulofasciata*

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5.4.3 Presence of Fish Species during First Pre-Monsoon, Post Monsoon and Second Pre-monsoon Aquatic Surveys

The following table is a comparative representation of the fishes that was found in all the three Aquatic Surveys conducted till date. The presence is noted as (✔) while the species that were not caught is left blank.

Table 7: Fish Species caught during Different Sampling Seasons

SL. No	Species Name	Pre-monsoon	Post-Monsoon	2nd Pre-Monsoon
1	*Aborichthys sp.*	✔	✔	✔
2	*Amblyceps apangi*		✔	✔
3	*Amblyceps arunchalensis*	✔		
4	*Amblyceps cerinum*			✔
5	*Apisdoperia sp.*		✔	
6	*Badis Badis*	✔	✔	✔
7	*Barilius barna*	✔	✔	✔
8	*Barilius bendelisis*	✔	✔	✔
9	*Barilius vagra*	✔	✔	✔
10	*Chaguniuschagunio*	✔	✔	
11	*Channa punctatus*			✔
12	*Channa gachua*	✔	✔	✔
13	*Channa melanostigma*	✔	✔	
14	*Crossocheilus latius*	✔	✔	✔
15	*Danio rerio*	✔	✔	
16	*Davario aequipinnatus*	✔		
17	*Garra gotyla*	✔	✔	✔
18	*Garra annandalei*	✔	✔	✔
19	*Glyptothorax panda*	✔	✔	✔
20	*Glyptothorax sp.*	✔	✔	✔
21	*Labeo dyocheilus*		✔	
22	*Lepidocephalicthysguntea*	✔		✔
23	*Mastacembelus armatus*	✔	✔	
24	*Neolissochilus dukai*		✔	✔
25	*Neolissochilus hexagonolepis*	✔	✔	✔
26	*Olyra longicaudata*			✔
27	*Olyra sp.*		✔	
28	*Oreichtyscrenucliodes*	✔		
29	*Paracanthocobitisab utwebi*			✔
30	*Pethia spp*	✔		
31	*Pethia ticto*	✔	✔	✔
32	*Pseudo chenesis sulcatus*			✔
33	*Psilorhynchus balitora*	✔	✔	✔
34	*Pterocryptis sp.*		✔	
35	*Schistura reticulo fasciata*			✔
36	*Schistura beavani*	✔	✔	✔
37	*Schizothorax progastus*	✔	✔	✔
38	*Schizothorax richardsonii*		✔	✔
39	*Semiplotus semiplotus*	✔	✔	
40	*Tor Putitora*	✔		✔

Note: The blue highlight is representative of the new fish species caught during the Second Pre-monsoon Aquatic Survey

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5.4.4 Photographs of Fish Species caught during the Second Pre-Monsoon Aquatic Survey

The following mentioned fishes were caught and released immediately into the river after taking photograph.

(1) **Scientific Name:** *Barilius barna*
Local Name: Barna Bari

(2) **Scientific Name:** *Barilius bendelisis*
Local Name: Hemiiton's barila

(3) **Scientific Name:** *Barilius vagra*
Local Name: Barilus Vagra

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(4) Scientific Name: *Crossocheilus latius*
Local Name: *Stone Roller/Gangnetic Latia*

(5) Scientific Name: *Garra annandalei*
Local Name: Aannandale Gara

(6) Scientific Name: *Garra gotyla*
Local Name: Cyprinus Gotyla

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(7) **Scientific Name:** *Neolissochilus hexagonolepis*
Local Name: Copper Mahseer

(8) **Scientific Name:** *Neolissochilus dukai*
Local Name: Neolissochilus dukai

(9) **Scientific Name:** *Pethia ticto*
Local Name: Ticto Barb

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(10) Scientific Name: *Schizothorax progastus*
Local Name: Dinnawah Snowtrout

(11) **Scientific Name:** *Schizothorax richardsonii*
Local name: Asla

(12) **Scientific Name:** *Tor putitora*
Local Name: Golden Mahseer

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(13) **Scientific Name:** *Psilorhynchus balitora*
Local Name: Balitora Minnow

(14) **Scientific Name:** *Aborichthys sp.*
Local Name: Not Found

(15) **Scientific Name:** *Lepidocephalichthys guntea*
Local Name: Not Found

(16) **Scientific Name:** *Amblyceps apangi*
Local Name: Not Found

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(17) **Scientific Name:** *Amblyceps cerinum*
Local Name: Not Found

(18) **Scientific Name:** *Glyptothorax sp.*
Local Name: Not Found

(19) **Scientific Name:** *Glyptothorax panda*
Local Name: Not Found

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(20) **Scientific Name:** *Schistura beavani*
Local Name: Not found

(21) **Scientific Name:** *Schistura reticulo fasciata*
Local Name: Not found

(22) **Scientific Name:** *Channa punctatus*
Local Name: Not Found

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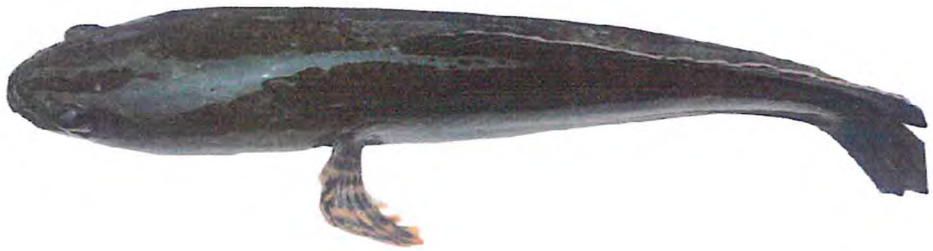
(23) **Scientific Name:** *Channa gachua*
Local Name: Snake Head



(24) **Scientific Name:** *Badis badis*
Local Name: Blue perch or Blue Badies

(25) **Scientific Name:** *Olyra longicaudata*
Local Name: Not Found

CONTACT NO.: +975-17449[illegible] EMAIL: tenzin85yeshi@gmail.com

(26) **Scientific Name:** *Paracanthocobitisab utwebi*
Local Name: Not Found

(27) **Scientific Name:** *Pseudo chenesissu lcatus*
Local Name: Not Found

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6. Conclusion

For the Second Pre-monsoon Aquatic Survey conducted on the 26th to 27th of May, 2020, a total of 27 species of fish were recorded (including *Tor putitora* /Golden Mahseer). Six new fish species that were not recorded during the First and Second Aquatic surveys were caught during the Third i.e. the Second Pre-monsoon Aquatic Survey.

A total of six new species of fish i.e. *Paracanthocobitisab utwebi, Amblyceps cerinum, Olyra longicaudate, Pseudo chenesissu lcatus, Schistura reticulo fasciata and Channa punctatus* were caught during Third Aquatic Survey. Five fish species i.e. *Schizothorax richardsonii, Semiplotus semiplotus, Mastacembelus armatus, Danio rerio and Chagunius chagunio* that were caught during the First and Second Aquatic Survey were found to be absent/ were not caught during Third Aquatic Survey. These absence and presence of fishes from the three seasons are mainly due to the migration and spawning pattern of the fishes. For instance, *Tor Putitora* is one type of fish that swim towards the south i.e. near the Indian border during the winter season (Kuensel, dec 7, 2018) and swim up to the rocky water beds for breeding during flood and spawn over rocky and gravel substrates (WWF India). Accordingly, two endangered species namely *Tor putitora* (Golden Mahseer) and *Amblyceps arunchalensis* were recorded during the First Pre-monsoon Survey while *Amblyceps arunchalensis* was not caught during the Second Pre-monsoon Study. For the Post-monsoon Study (Second Aquatic Study) both of these endangered fish species were not caught (a total of 28 species were recorded).

Among the fish species, *Barilius barna, Barilius bendelisis, Barilius vagra, Garra gotyla & Badis Badis* were common catches in most of the sites as these fish species are less likely to migrate and can thrive in shallower river unlike the above mentioned fishes. Fish species like *Paracanthocobitisab utwebi, Amblyceps cerinum, Olyral ongicaudate, Pseudo chenesissu lcatus, Labeo spp., Olyra spp. & Mastacembelus sp.* were not frequently caught. According to the experts, those species prefer deep river and thrive at greater depth where the electro fisher operator could not reach during the survey

S3, S4 & S5 were found to have the highest number of species as the disturbance (sand & surface boulder collection) in these sites remained fairly absent therefore the presence of fishes were more likely.

Till date, there were 27 fish species recorded during each of the First and the Second Pre-monsoon Aquatic Studies respectively. For the Post-monsoon Aquatic Survey, 28 fish species were caught. Cumulatively, a total of 40 fish species have been noted from the Three Aquatic Surveys conducted till date i.e. for spring, autumn season (2019) and winter (2019-2020).

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Appendix 1: List of Persons Involved

SN	Names	Designation	Organization
1	Mr. Pemchung	Environment Manager	Construction Development Corporation Limited
2	Ms. Sonam Deki	Environmentalist	Gyaltshen Consultancy
3	Mr. Ashok Kumar	HSE-In charge	AFCONS Infrastructure Limited
4	Mr. Sunny	Env. Engineer	AFCONS Infrastructure Limited
5	Ms. Kinley Yangzom	Jr. Environmental Officer	AFCONS Infrastructure Limited
6	Mr. Yeshey Tenzin	Quality Manager	Bhutan Ecolab Services
7	Mr. Anand Bhandari	Environmental Officer	Bhutan Ecolab Services
8	Mr. Sangay Norbu	Senior ES (III)	National Research Centre for Riverine & Lake Fisheries
9	Mr. Kellay Wangdi	Staff	Bhutan Ecolab Services
10	Mr. Tek Bdr Ghallay	Staff	Bhutan Ecolab Services
11	Mr. Ngawang Pelden	Staff	Bhutan Ecolab Services

Appendix 2: Letter to National Center for Riverine & Lake Fisheries

05/03/2020

To
The Director General,
Department of Livestock,
MoAF, Thimphu.

Subject: Seeking an Assistance to carryout Fish sampling (26/03/2020 to 28/03/2020) at Ammochu (Phuntsholing Township Development Project).

Respected Dasho,

We would like to seek Dasho's kind approval for getting assistance from National Research Centre for Riverines and Lake Fisheries (NRCRLF) to carryout aquatic survey (Fish Sampling). Our aim of the study is to assess the fish diversity and presence of Golden Mahseer (critically endangered fish) for conservation recommendation during and after the Phuntsoling Township Development Project.
Since, we have got study approval from Department of forest and parks services to carry out the study, we would be highly grateful if Department of livestocks could kindly assist us with technical and manpower support from the NRCRLF,Haa.
We have contacted with technical person at NRCRLF and advised us to get an approval from Department of Livestock.
We anticipate your kind support and extend our gratitude for helping in our first aquatic survey held in March, 2019.

Thanking you,
Yours faithfully,

Yeshi Tenzin
(Lab Manager)
17449115

BHUTAN ECOLAB SERVICES
Quality Manager

BHUTAN ★ PHUENTSHOLING ★

AFCONS INFRASTRUCTURE LTD. BHUTAN

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Appendix 3: Clearance letter for the Aquatic Survey

Royal Government of Bhutan
Ministry of Agriculture & Forests
Department of Forests & Park Service
NATURE CONSERVATION DIVISION
Managing Bhutan's Natural Heritage"

NCD/SCMS-02/2019-20/ 229 — 2nd March 2020

The Project Manager.
PIU, PTDP, CDCL.
Thimphu

Subject: Approval for Aquatic Survey on the Amochhu for Phuentsholing Township Development Project

Sir,

The Nature Conservation Division, Department of Forests and Park Services, acknowledges the receipt of the report on Post Monsoon Aquatic Survey conducted on the Amochhu from 21st October to 23rd October 2019.

Based on the subsequent request for approval as per letter No. CDCL/PTDP/PIU/2020/09/431 dated 29th February 2020 for the same survey, we would like to convey the approval to conduct aquatic survey in three specified micro-habitats one each at the project site, upstream, and downstream as described in the proposal. However, please note that approval is only valid for survey sites within our national jurisdiction during this season. Fish survey should strictly deploy the catch and release method using electroshocker (3kw) only or improvised nets.

We would like to request you to kindly liaise with the concerned forest offices for awareness and monitoring during the field survey.

Once the survey is completed, kindly share a copy of the report/information generated from this study to this office for our record and reference.

Thanking you.

Yours sincerely,

(Sonam Wangdi)
Chief Forestry Officer

cc.
- Director, Department of Forests and Park Services for kind information
- Chief Forestry Officer, Gedu Forest Division for kind information and necessary action

Telephone # : +975 02 325042/324131 Fax # : +975 02 335806 Post box #: 130

BHUTAN ECOLAB SERVICES PHUENTSHOLING

AFCONS INFRASTRUCTURE LTD. BHUTAN

Appendix 20

COVID-19 Workplace Safeguard Protocol

Compliance Report No.1

Phuentsholing Township Development Project
JUNE-2020

Table of Contents

About the Project

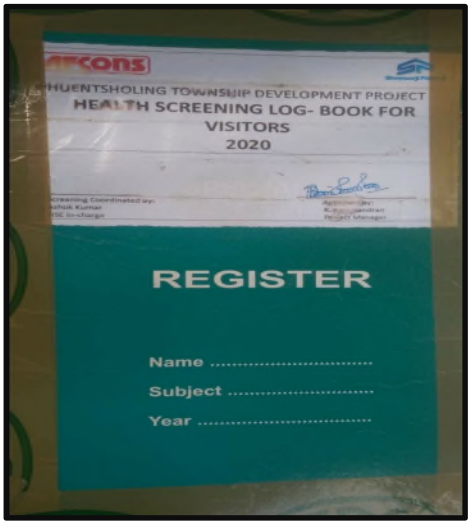
Phuentsholing is located adjacent to the Amochhu River on Bhutan's southwestern border with India (Jaigoan, Alipurduar district, West Bengal). It is the country's economic capital and main trading gateway with India. Phuentsholing Township Development Project (PTDP) is currently developing 464 hectares of riparian land near Phuentsholing City by training the river along both banks of Amochhu. The area reclaimed after river training will be used for the development of township construction. The project aims to protect the existing and new towns from floods and riverbank erosion which currently threatens lives/livelihoods and disrupts connectivity with nearby communities.

With the detection of the first confirmed case of COVID-19 in the country on the 5th of March 2020, the PTDP Health Safety and Environment team had established a Workplace Safeguard Protocol to as a means of mitigating risk and to prevent the spread of the virus in the project area. This report is a compilation of the till date compliance to the PTDP Workplace Safeguard Protocol by the project.

Compliances in the Office Area

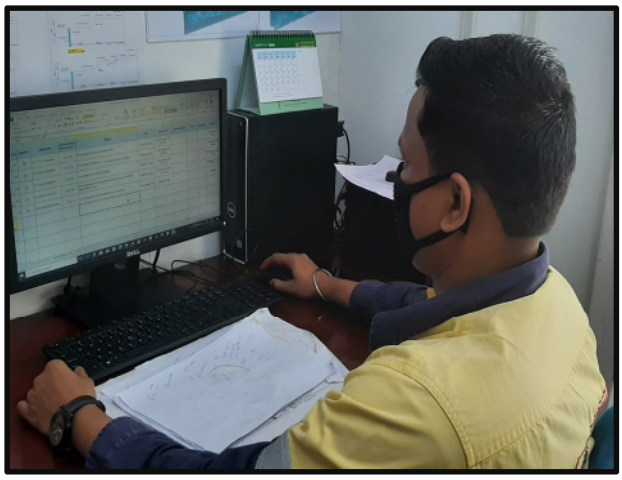
1. Before Entering the Offices (Employee and Visitors inclusive)

All employees are required to download the Druk Trace mobile application and to scan the Quick Response Code whenever they are travelling. Both visitors and employees are required to water their hands (with soap and water), scan the PTDP QR code and get a thermal scan before entering the office area. Additionally, visitors are to register in the visitors log with details of their residence, where they are coming from, their thermal scan reading, their contact number etc. Apart from advocating handing of hands regularly, hand Sanitizer are also made available before enter the offices. Additionally, a daily and weekly report of total thermals scans conducted is also sent to the Drungkhag office, Phuentsholing via the Project Implementing Unit.



2. Inside the Offices

Frequent washing of hands is advised. Physical meetings/ any activity that require gathering of three or more people are avoided; however, in case of necessary meetings social distancing is maintained during any meetings. All employees are required to wear mask at all times in the office.



Thermal scans are also done inside the offices to ensure that all the employees are scanned once a day by the Health Safety & Environment Team personnel of the Project.

Compliances in the Camps Area

1. Camps

Hand washing stations are placed at the entrance point of the camp. Workers and officials entering the camp area are to wash their hands. Anyone entering or exiting the camp (during the morning hours i.e. wok shift change) are scanned for higher than normal temperature HSE personnel and external agency engaged by the office before commencement of work.

A focal person from each camp has been identified that are responsible for the following roles as per the workplace safeguard policy:

- ✓ Ensure that all employee and family members within their respective camps follow a good sanitary habit as advice by the Ministry of Health (MOH, Bhutan) on COVID-19
- ✓ Logs (Name, Travel history, contact details) of any visitors entering the camp is to be noted
- ✓ Logs of workers or officials going out of Phuentsholing are to be maintained
- ✓ Maintain a record of all employees and family members in each camp
- ✓ record movements of people (checking in and out of the camps including family members)

Table 1 is representative of the list of Focal Person from each camp in Phuentsholing Township Development.

Table 1: List of Focal Persons from each Camp

Sl. No	Name	Contact Number	Focal person of
1.	Mr. Ashok Kumar	(+975) 17325971	AFCONS COVID-19 Focal Person
2.	Mr. Kamlesh Mamgain	(+975) 17327152	
3.	Mr. Biswanath Mandal	(+975) 17912769	AFCONS Engineer's Camp
4.	Mr. Ram Bahadur Singh	(+975) 17327398	AFCONS Supervisors and PRW camp
5.	Mr. Pemchung	(+975) 17867955	PIU COVID-19 Focal Person
6.	Ms. Tshering Pelden	(+975) 17824382	
7.	Mr. Namgay Wangchuk	(+975) 1736885	PIU Camp Focal Person
8.	Ms. Kinley Dema	(+975) 17292530	
9.	Mr. Phuentsho Namgay	(+975) 17828484	PIC COVID-19 Focal Person
10.	Ms. Sonam Deki	(+975) 77893929	

2. COVID-19 Duty Vehicles

Two vehicles and their respective drivers have been identified and will be used as "On Covid-19 duty" in case of Covid-19 emergency. The drivers and vehicle will be issued the cards (refer **Figure X ad Figure X)** ONLY during emergency.

Authorization Card to be pasted on the Vehicle

Authorization Card to be issued to the Driver

3. Engineer and Supervisor Dining Halls

Social distancing is maintained in Engineer as well as the Supervisor's dining hall. To ensure that at least a certain distance is maintained, the dinning queue is marked.

Compliances in the Site

1. Active Work Sites

All workers are to be equipped with Personal Protective Equipments and social distancing (as much as possible) is maintained.

To encourage washing of hands regularly, hand washing stations have been installed at each active work site in the project area. Additionally, to advocate the significance of frequent washing of hands during the pandemic, PTDP has installed hand washing stations in the neighboring locations of the project.

2. Material Loading and Uploading

The PTDP Logistics and HSE team ensures that all construction material loading and unloading procedure is as per the rules and regulations of the Royal Government of Bhutan and the Department of Revenue and Customs under the Ministry of Finance. That is, the vehicle will be led by either a security personnel or by the concerned department employee till their destination. After parking the vehicles for unloading of the materials, the vehicle is then barricaded.

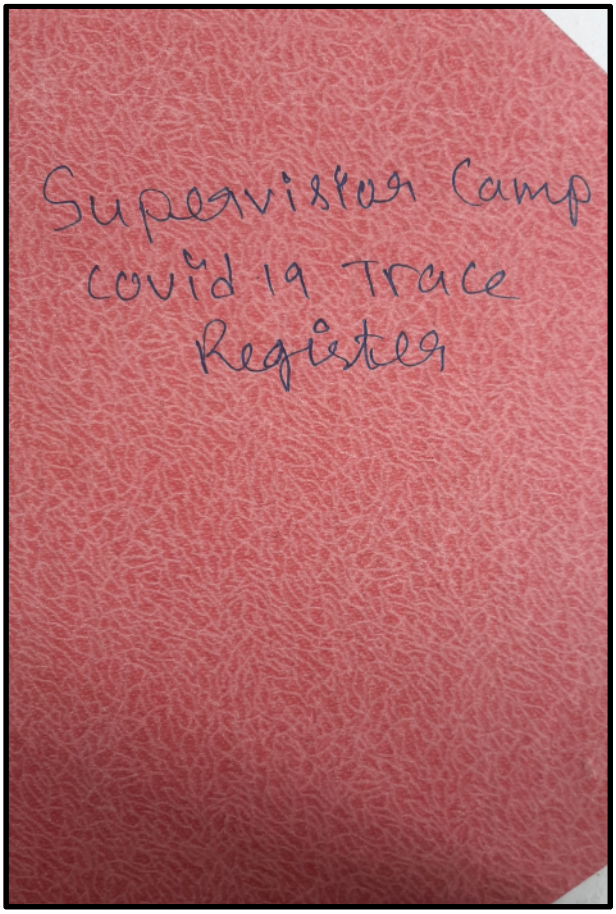
Thermal screening is done for the driver then moved to the sheds specifically meant for the drivers. Designated toilet is allocated for the driver and is then disinfected after use. Additionally, while providing food or tea to drivers, disposable plates and disposable glass are used.

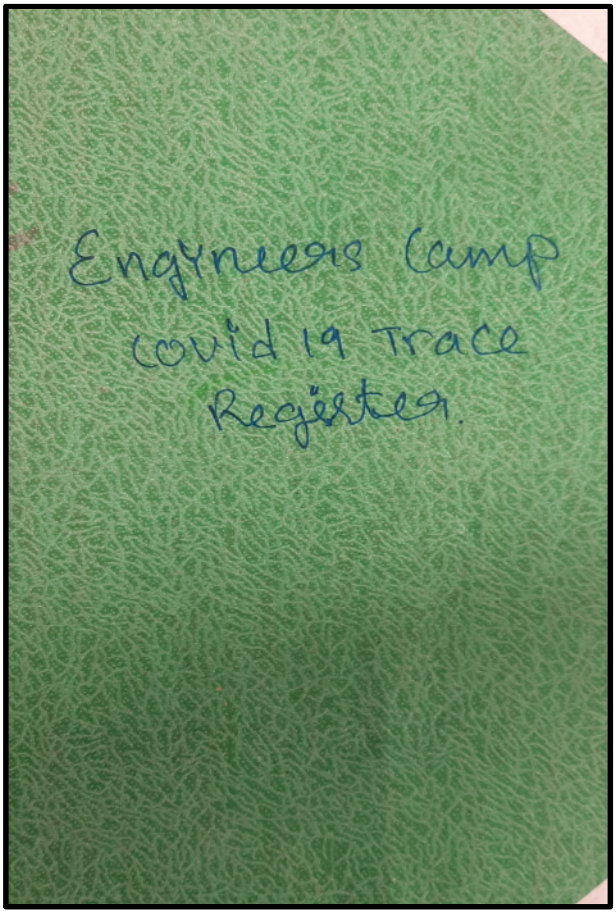
3. Buses

Hand sanitizers are made available inside the bus to encourage regular sanitization of hands. All individuals are instructed on the wear their nose mask and maintain social distancing inside the bus (if possible). To further, minimize the risk of any infection the entry of non-project individuals is prohibited.

Compliances with the Travel Records

The administrative department ensures that the office employees are updated on the latest COVID-19 news in Bhutan and Globally. Accordingly, the department assesses the benefits/risks related to the upcoming travel plans. That is, the office avoids sending employees who may be at higher risk of serious illness (e.g. older employees and those with medical conditions such as diabetes, heart and lung disease) to areas where COVID-19 is spreading. The travel report of all employees is noted by the respective camp supervisors/ covid-19 focal person.





If an individual develops a mild cough or low-grade fever (i.e. a temperature of 37.3 C or more) then he/she is advised to not come for work and inform the Human Resource officer.

Corona Virus Awareness at Site

1. First Covid-19 Awareness

On the 7th of February, 2020 Phuentsholing Township Development Project had two of the doctors from Phuentsholing General Hospital visiting the project site to inform and aware the project personal on the corona virus outbreak. The information session was attained by the Project Manager and the Environmental Manager from PIU, Team Leader &Deputy Team Leader from PIC and the HSE Team of AFCONS.

The session covered general briefings on the virus i.e. how it is/can be transmitted, signs and symptoms and some preventive measures. Accordingly, the doctors also gave a demonstration on how one should wash their hands (so as to minimize infection) and the procedure to proper use and disposal of the mask.

2. Second Covid-19 Awareness Training

On the 27th of June, 2020 Phuentsholing Township Development Project had four of the doctors from Phuentsholing General Hospital visiting the project site to inform and aware the project personal on the corona virus outbreak. The information session was attained by individuals who missed the last COVID-19 session; the session was mainly meant for the workers and supervisors of PTDP.

The session covered general briefings on the virus i.e. how it is/can be transmitted, signs and symptoms and some preventive measures. Accordingly, the doctors also gave a demonstration on how one should wash their hands.

3. Covid-19 Awareness at Site

Health briefing sessions involving Covid-19 as well as Dengue are being conducted at site on a timely basis by the HSE team.

EGIS International
PIC Site Office
Near NHDCL Housing Colony
Amochu, Phuentsholing, Chukha

Our Ref: PIC/EMP/RE/2020/1038
Date: 27th July 2020

Mr. Kamal Dhakal
Project Manager
Project Implementation Unit, CDCL.

Contract Package : Phuentsholing Township Development Project
Contract N° : PTDP-PIC-01

Subject: Quarterly Project Report N°7 Period from 1st April to 30 June 2020, Version 01

Dear Sir,

This is to inform you that PIC's Quarterly Project Report N°7 Period from 1st April to 30 June 2020, Version 01 with the content as follows:

- Quarterly Project Report N°7 Period 1st April – 30 June 2020, Version
- Updated Project Risk register (Risk Management Plan)
- Project Progress Evaluation (As a part of PPMES / DMF)
- Emission Test Certificate
- Calibration Certificate
- Terrestrial Report for Period March 2020 – May 2020
- Second Pre-Monsoon Aquatic Study Report
- COVID-19 Work Place Safeguard Protocol, Compliance Report No.1

are sent through the corresponding email for your kind review / approval.

Yours Sincerely,

egis International Gyaltshen

Edwin Anggrijatno
PIC Engineer's Representative

Cc:
1. *PIC (PD)*