

# Environment Monitoring Report

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Semestral Report: May-October 2020

July 2021

## Bhutan: Urban Infrastructure Project

Prepared by the Department of Engineering Services for the Royal Government of Bhutan and the Asian Development Bank.

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## **TABLE OF CONTENTS**

<b>CHAPTER</b>	<b>PAGE</b>
<b>1. Introduction</b>	<b>4</b>
1.1 Overall project description and objectives	4
1.2 Environmental category as per ADB Safeguard Policy Statement, 2009	5
1.3 Environmental category of each subproject as per national laws and regulations	5
1.4 Project Safeguards Team	8
1.5 Overall project and sub-project progress and status	9
1.6 description of subprojects and implementation status	10
<b>2. Compliance Status with National/State/Local Statutory Environmental Requirements</b>	<b>11</b>
<b>3. Compliance Status with Environmental Loan Covenants</b>	<b>12</b>
<b>4. Compliance Status with the Environmental Management Plan</b>	<b>14</b>
4.1 Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.	14
4.2. For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards	15
4.3. With reference to approved EMP/site-specific EMP/construction EMP, complete the table below	16
<b>5. Approach and Methodology for Environmental Monitoring of the Project</b>	<b>33</b>
5.1. Briefly describe the approach and methodology used for environmental monitoring of each sub-project.	33
<b>6. Monitoring of Environmental impacts on Project Surroundings (Ambient Air, Water Quality and Noise Levels)</b>	<b>33</b>
6.1 General conditions of surroundings at the Project site	33
<b>7. Grievance Redress Mechanism</b>	<b>36</b>
7.1. Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).	36
<b>8. Complaints received during the reporting period</b>	<b>37</b>
8.1. Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).	37

<b>9. Summary of Key Issues and Remedial Actions</b>	<b>37</b>
9.1. Summary of follow up time-bound actions to be taken within a set timeframe.	37
<b>10. APPENDICES</b>	<b>38</b>
<b>a) Appendix A _ Environment Clearances, water analysis, EMP, HIV/AIDS campaigns</b>	<b>38</b>
Annex 1: Environmental Clearance – WWTP at Babesa, Thimphu Thromde	39
Annex 2: Environmental Clearance – Bridge Construction, Phuentsholing Thromde	42
Annex 3 (a): Environmental Clearance – Water Supply, Samdrup Jongkhar Thromde	46
(b): Compliance Report Format	50
(c) : Detailed Implementation Plan Format	52
Annex 4: Effluent Water Analysis, Raw Sewage water, WWTP- Thimphu Thromde	53
Annex 5: Environmental Management Plan, WWTP-Thimphu Thromde.	56
<b>b) Appendix B _ Photographs</b>	<b>66</b>
Annex 6: Photographs from Field Visits for Components 1, 2, & 3.	66
<b>c) Appendix C _ Environmental Criteria and Standards</b>	<b>72</b>

### List of Tables

Table 1: Project Components under various Thromdes	4
Table 2: Government Environmental Policies, Laws, Regulations and Standards	5
Table 3: Environmental Regulatory Compliance	8
Table 4: Project Safeguard Team	8
Table 5: Sub-project Status	9
Table 6: Sub-projects Implementation status	10
Table 7: Compliance Status with national Environmental Requirements	11
Table 8: Compliance Status with Environmental Loan covenants	12
Table 9: Package-wise IEE Documentation Status	15
Table 10: Package-wise Contractor/s' Nodal Persons for Environmental Safeguards	15
Table 11 (a): Summary of Environmental Monitoring Activities_WWTP	16
Table 11 (b): Summary of Environmental Monitoring Activities_Bridge Construction	24
Table 11 (c): Summary of Environmental Monitoring Activities_Water Supply	25
Table 12: Compliance with CEMP/ EMP	33
Table 13: Effluent water quality (WWTP)	35
Table 14: Sub-project status	37

# 1. INTRODUCTION

## 1.1 OVERALL PROJECT DESCRIPTION AND OBJECTIVES

1. The Royal Government of Bhutan (RGoB) had signed a loan agreement (Loan Agreement No. 2258–BHU) in the year 2007 with the Asian Development Bank (ADB) for implementation of Urban Infrastructure Development Project (UIDP). The implementation activities were completed and project closed in 2014. This project aimed to cover Thimphu, Phuentsholing and Dagana.
2. Later on Government expressed their need for further infrastructure development in Bhutan and requested ADB for project preparation to ensure sustainable urban development in additional towns. ADB conducted a PPTA study under TA 7360 and identified work components in the following towns – Thimphu, Phuentsholing, Samdrup Jongkhar and Rinchenthang (Nganglam). Accordingly a proposed Urban Infrastructure Project (UIP) framed up by ADB in the year 2011. It was conceptualised and planned that UIP would follow the ongoing Urban Infrastructure Development Project (UIDP). The main basis for urban infrastructure investment is the Government's Structure Plans and Local Area Plans (LAP). These LAPs prioritise urban infrastructure requirements with tentative costs. The aim of improving, upgrading and expanding the urban infrastructure facilities and providing basic urban services materialised when RGoB concluded a loan agreement with ADB.
3. The name of the project is “Urban Infrastructure Project” under ADB Loan 2816-BHU. The loan was approved by ADB in November 2011 and declared effective in April 2012. The project schedule is to start on May 2013 with a completion target date of 14 February 2018. The total project cost is estimated at \$23.3 million, of which ADB is financing \$19.8 million and the RGoB is financing \$3.5 million.
4. The Executing Agency (EA) is the Department of Engineering Services (DES) under MoWHS. The EA will be supported by its Project Management Unit (PMU) headed by a Project Manager (PM) and the Project Implementation Units (PIUs), headed by PM of the PIUs from the Project areas of Thimphu, Phuentsholing and Samdrup Jongkhar. Further the PMU and the PIUs will be supported and guided by Project Management Consultancy (PMC) Unit from SMEC, India and the Design, Monitoring, Supervision Consultant (DMSC) from STUP Consultancy, Kolkata respectively.
5. The project will support the Government's efforts toward sustainable urban development in Thimphu, Phuentsholing and Samdrup Jongkhar Municipality (SJM).

**Table 1:** Project components under various Thromdes

Sl. No.	Component	Thromde (Municipality)	Detail
1	Waste water	Thimphu	Construction of Wastewater Treatment Plant
2	Road and Bridge	Phuentsholing	Planning, Survey, Investigation and Design of Second Bridge and Approach Roads
3	Water Supply (Rehabilitation)	Samdrup Jongkhar	Water Resource Study Design of Water Supply facilities and rehabilitation Design of Wastewater facilities

## 1.2 Environmental category as per ADB Safeguard Policy Statement, 2009

The implementation of the Project will be governed by Asian Development Bank Safeguard Policy Statement (SPS, 2009) and the environmental laws, policies and regulations of the government.

The ADB SPS stipulates addressing environmental concerns, if any, of a proposed activity in the initial stages of project preparation. For this, the ADB SPS categorizes the proposed components into categories (A, B or C) to determine the level of environmental assessment required to address the potential impacts. The Project has been categorized as B. Accordingly this IEE is prepared to address the potential impacts in line with the SPS. Stakeholder consultation was an integral part of the IEE which was carried out and an EMP specifying mitigation measures to be adhered to during implementation of the Project has been prepared.

## 1.3 Environmental category of each subproject as per national laws and regulations

The Royal Government of Bhutan mandates all projects be subjected to environmental assessments prior to implementation. The implementation of the Project will be governed by laws, regulations, and standards for environmental assessment and management of the government. **Table 1** summarizes the main requirements of the government for environmental management that will apply to the Project.

**Table 2:** Government Environmental Policies, Laws, Regulations, and Standards

Statute	Outline	Relevance
Environmental Assessment Act, 2000	This Act establishes procedures for the assessment of potential effects of projects on the environment, and aims to determine measures to reduce potential adverse effects and to promote environmental benefits.	<ul style="list-style-type: none"> <li>To ensure that all foreseeable impacts on the environment, including cumulative effects are fully considered prior to any irrevocable commitments of resources or funds.</li> <li>To ensure that all feasible alternatives are fully considered.</li> </ul>
Regulation for The Environmental Clearance of Projects (RECOP), 2002	Regulation for Environmental Clearance of Projects (RECOP) defines responsibilities and procedures for the implementation of the Environmental Assessment Act, 2000 for issuance and enforcement of environmental clearances.	<ul style="list-style-type: none"> <li>To ensure that all projects are implemented in line with the sustainable development policy of the Royal Government of Bhutan</li> <li>To ensure that all feasible means to avoid or mitigate damage to the environment are implemented; and</li> <li>To ensure that concerned people benefit from projects in terms of social facilities.</li> </ul>
National Environment Protection Act, 2007	The aim of this Act is to enable an effective system of conserving and protecting Bhutan's environment. This system is constituted of the National Environment Commission or other designated Competent Authorities and advisory committees responsible for independently regulating and promoting sustainable development in an equitable manner.	<ul style="list-style-type: none"> <li>The Act provides a framework for developing measures and standards to protect Bhutan's environmental quality. Guidance relevant to this project includes:</li> <li>Handling of hazardous substances: No person shall handle or cause to be handled any hazardous substance except in accordance with such procedure and after complying with such safeguards as may be prescribed under national and international instruments.</li> <li>Discharge of environmental pollutants: No person shall discharge or emit or be permitted to discharge or emit any pollutants in excess of such standards as may be prescribed.</li> </ul>

Statute	Outline	Relevance
Waste Prevention and Management Act of Bhutan, 2009	<p>The Waste Prevention and Management Regulation 2012 is adopted under section 53 of the Waste Prevention and Management Act, 2009. This Act defines the institutional framework for preventing and managing waste in Bhutan, including the establishment of sound waste management system, including monitoring procedures at every organizational level, through efficient collection, segregation, treatment, storage, transportation, reduction, reuse, recycling and safe disposal of solid, liquid and gaseous wastes. It sets out the principles, measures, mechanisms and responsibilities for reduction, segregation, and appropriate disposal of waste to protect the country's environment.</p> <p>The act also provided the requirements for the management of hazardous wastes to include: labeling, pre-treatment process, storage, record keeping, transportation, and disposal of hazardous waste by the generator. Sanctions and penalties are provided for non-compliance.</p>	<ul style="list-style-type: none"> <li>Waste management requirements of relevance to the proposed development include:</li> <li>Non-hazardous waste: Implementing agencies shall ensure that the reduction, reuse, recycling and disposal of non-hazardous waste are addressed in an environmentally sound manner to ensure compliance with the Act</li> <li>Hazardous waste: Implementing agencies shall prevent manufacturing of products with potential to generate hazardous waste. The agencies shall also ensure that the reduction, storage, treatment, and disposal of hazardous waste are addressed in an environmentally sound manner to ensure compliance with the Act</li> </ul>
General Rules and Regulations on Occupational Health and Safety (OHS) In Construction, Manufacturing, Mining and Service Industries, 2006	OHS Rules and Regulations aims 'to assure safe and healthful working conditions for working men and women as well as other persons present at workplaces from work related risks to their health, safety, and well being	During Construction and operation stage of the project.
The Labour and Employment Act of Bhutan, 2007	The labour and employment act of Bhutan 2007 provide policies and programs in the areas of employment promotion, labour protection and relations, vocational education and training, and occupational standards setting and certification.	The proposed development will adhere to the policies provided under different sections of the Act.
The Forest Act (1969).	The first environmental legislation in Bhutan. It brought all forest resources under government custody to regulate utilization.	This was repealed with the enactment of the FNCA in 1995

Statute	Outline	Relevance
Forest and Nature Conservation Act (FNCA) 1995	Allows community stewardship of forests and aims to provide protection and sustainable use of forests, wildlife, and related natural resources.	Schedule I of the Act, lists those wild animals and plants that are given full protection under the Act. The FNCA establishes that all forests in Bhutan are Government Reserved Forests (GRF), and prohibits any development activity in these areas except with a permit.
Forest and Nature Conservation Rules & Regulations (FNCRR) 2017	Under powers established by the FNCA, the Ministry of Agriculture & Forests promulgated the FNCRR in 2000, which was revised in 2006 and finally in its Fourth Edition in 2017 superseded all government notifications, circulars orders and earlier rules and regulations.	Amongst other things the FNCRR allows for: <ol style="list-style-type: none"> <li>1. Allotment of land and land rights in GRF;</li> <li>2. Prohibitions, restrictions and concessions in GRF;</li> <li>3. Transport and trade of forest produce;</li> <li>4. Declaration and administration of protected areas;</li> <li>5. Protection of wildlife and use of certain wild species;</li> <li>6. Prevention of forest fires, land clearance, and activities potentially impacting soil, water and wildlife resources; and</li> <li>7. Enforcing penalties for offences related to these and other aspects of the FNCRR.</li> </ol>
Land Act 1979 (Revised 2007)	The Land Act 1979 provides the basis for land tenure in Bhutan was revised in 2007 to streamline many provisions in the Land Act. One major Change was the establishment of an autonomous National Land Commission Secretariat which has been given full responsibility for all matters pertaining to land registration. Land categories have been reduced to seven including i) Chhuzhing (wetland), ii) Kamzhing (dry land) including orchard, iii) Khimsa (Residential land), iv) Industrial land, v) Commercial land, vi) Recreational and vii) Institutional land.	Under this Act, there are provisions for acquisition of land by the Government, if it is required for the benefit of the country. In such cases, the affected person will be compensated with substitute land from the same Dzongkhag or given cash compensation depending on the land classification as per the prevailing land compensation rate determined by the Act. If a house is acquired, compensation is paid on the basis of an evaluation carried out by a qualified engineer appointed by the competent authority.

FNCA = Forest and Nature Conservation Act, 1995; FNCRR= Forest and Nature Conservation Rules& Regulations 2017; GRF= Government Reserved Forests; OHS = Occupational Health and Safety.

The policy, legal, and administrative frameworks relevant to the environmental assessment of infrastructure projects in Bhutan have been established by the following laws and regulations: (i) the National Environmental Protection Act of 2007, (ii) the Environmental Assessment Act of 2000, and (iii) Regulation for Environmental Clearance of 2002. At the national policy level, environmental protection and conservation is a constitutional mandate to:

- (i) Protect, conserve, and improve the pristine environment;
- (ii) Safeguard biodiversity; and
- (iii) Prevent pollution and ecological degradation.

**Environmental Clearance Requirements:** Article 33.1 of the Environmental Assessment Act 2000, grants the competent authority (CA) a power to screen, issue or deny the environmental clearance of the activities or project listed under Annex 2 of RECOP 2002. However, the Executing Agency (MoWHS) cannot issue an environmental

clearance to itself or the Departments directly under it; even for the listed activities of the RECOP. However, it can issue the clearance to organizations like Thromdes which are autonomous organizations.

However, the Thromdes are obliged to fill up the standard IEE forms and submit it to the MoWHS along with the no objection certificates (NOC) from the affected persons or public and other stakeholders.

**Table3: Environmental Regulatory Compliance**

Component Description	Royal Government of Bhutan		ADB	
	Competent Authority in accordance with ECR	Environmental Assessment	Category in accordance with SPS	Environmental Assessment
<b>Component 1: Thimphu Thromde</b> Construction of Waste Water Treatment Plant.	MoWHS or NEC	Environmental Information	Category B **	IEE and EMP
<b>Component 2: Phuentsholing Thromde</b> Construction of 46.8 m PSC Box Girder Bridge	MoWHS or NEC	Environmental Information	Category B **	IEE and EMP
<b>Component 3: Samdrup Jongkhar Thromde</b> <u>Water supply:</u>  i) Intake ii) Transmission Mains iii) WTP iv) Clean Water Reservoir (CWR) v) Site office vi) Approach Road and Intake Improvement works	MoWHS or NEC	Environmental Information	Category B **	IEE and EMP

ADB = Asian Development Bank, ECR\* = Environmental Clearance Regulations, EMP = Environmental Management Plan, IEE = Initial Environmental Examination, NACSQC- = National Authority for Construction Standards and Quality Control, NEC = National Environment Commission, SPS = Safeguard Policy Statement, TRIP = Thimphu Road Improvement Project.

\*\*Nothing is envisaged at this stage that could cause reclassification to Category A.

## 1.4 Project Safeguards Team

**Table 4: Project Safeguard Team**

Name	Designation/Office	Email Address	Contact Number	Roles
<b>1. PMU</b>				
Jigme Dorji	Project Manager	<a href="mailto:jdorji@mowhs.gov.bt">jdorji@mowhs.gov.bt</a>	17643516	
<b>2. PIUs</b>				
a) Thimphu Thromde				
Kinley Penjore	Project Manager	<a href="mailto:kpenjore@thimphucity.gov.bt">kpenjore@thimphucity.gov.bt</a>	17379020	
Thukten Tshereing	Project Engineer		17111649	
Tashi Dorji	Project Engineer		17172677	
b) Phuentsholing Thromde				
Anu Pradhan	Project Manager	<a href="mailto:piuadbpt2012@gmail.com">piuadbpt2012@gmail.com</a>	17118279	
Bikash Sharma	Project Engineer	<a href="mailto:bsharma@pcc.bt">bsharma@pcc.bt</a>	17372162	
c) S. Jongkhar Thromde				
Mani Kumar Rizal	Project Engineer	<a href="mailto:mkrizal@sjthromde.gov.bt">mkrizal@sjthromde.gov.bt</a>	17661316	
Sherab Wangda	Technician		17948510	
<b>3. Consultants</b>				
K.D. Chamling	Environment Specialist	<a href="mailto:chamlingkd@gmail.com">chamlingkd@gmail.com</a>	17111541	
Rajesh Pradhan	Social Safeguard Specialist	<a href="mailto:rajpradhan2008@gmail.com">rajpradhan2008@gmail.com</a>	17603661	



## 1.5 Overall project and sub-project progress and status

Till 2<sup>nd</sup> November 2020, all the three components have been awarded and nearing completion with one component, Phuentshoing Thromde, completed. **Table 5** below shows the project packages, starting date of implementation, schedule date of completion etc. along with physical progress.

**Table 5: Sub-project status**

Sl. No	Component	Location/ Area of Activities	Start date of Implementation	Actual months of completion	Actual date of completion	Physical progress (%) as on 2 <sup>nd</sup> November 2020
<b>1</b>	<b>Component 1: Thimphu Thromde</b>					
	Construction of Waste Water Treatment Plant.	Babesa LAP	10/Nov/2016	30	9 <sup>th</sup> May 2019	98%
	- Completion of designs				End of Feb '19	100%
	- Construction of Office building				End of Dec 2018	100%
	- Construction of staff quarter				End of Dec 2018	100%
	- Electrical control building				End of Dec 2018	100%
	- Sequencing Batch Reactor (SBR)				End of April 2019	100%
	- Pump House				End of Feb 2019	100%
	- Blower and Chlorination building				End of March 2019	100%
	- Centrifuge and Sludge holding Sump				End of Feb 2019	100%
	- Thickened Sludge and Supernatant Sump				End of March 2019	100%
	- Head Works				May 2019	100%
	- Transformer and DG Room				End of Dec 2018	100%
	- Pedestal and Pipe line				Jan 2019	100%
	- Procurement and Supply				May 2019	98%
<b>2</b>	<b>Component 2: Phuentsholing Thromde</b>					
	Construction of 46.8 m PSC Box Girder Bridge	Over Om Chhu, near Youth Center	1/August/2017	18	20 Feb 2019	100%
<b>3</b>	<b>Component 3: Samdrup Jongkhar Thromde</b>					
	Water supply: Intake, Transmission Main & WTP, Office building	Rikkechhu and 4 km North of Samdrup Jongkhar Town (Char kilo)	1/5/2016	18	15 Nov 2018* (revised date)	98%**
	Approach Road construction & Intake Improvement works	Rikkechhu	28/3/2019	6	13/11/2019	100%

\* New completion date was extended till 15th November 2018 and currently the work is under Liquidity Damage period.

\*\* 2% balance work (auto-commissioning) as the PIU is waiting for the engineer's input and delayed due to COVID 19.

## 1.6 Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

**Table 6: Sub-projects Implementation status**

Package Number	Components/List of Works	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) <sup>1</sup>	If On-going Construction	
				%Physical Progress	Expected Completion Date
<b>1. Thimphu Thromde</b>	Construction of Waste Water Treatment Plant.	Contract awarded.	On-going construction.	98%	End of October 2020*
	- completion of drawings/designs		Complete	100%	Complete
	- construction of administrative building		Complete	100%	Complete
	- construction of staff quarters		Complete	100%	Complete
	- Electrical control building		Complete	100%	Complete
	- Sequencing Batch Reactor (SBR)		Complete	100%	Complete
	- Pump House		Complete	100%	Complete
	- Blower and Chlorination building		On-going construction.	100%	Complete
	- Centrifuge and Sludge holding Sump		Complete	100%	Complete
	- Thickened Sludge and Supernatant Sump		Complete	100%	Complete
	- Head Works		Complete	100%	Complete
	- Transformer and DG Room		Complete	100%	Complete
	- Pedestal and Pipe line		Complete	100%	Complete
	- Procurement and Supply		Awaiting delivery due to COVID19 pandemic.	98%	Complete
<b>2. P/ling Thromde</b>	Construction of 46.8 m PSC Box Girder Bridge	<b>Construction of bridge completed in March 2019 and the site handed over to Thromde.</b>			
<b>3. S. J/khar Thromde</b>	a) Water supply:	Contract awarded.	On-going construction.	98%	<b>15 Nov 2018**</b>
	- Intake – raw water equipment	Procurement awarded.	Complete		Complete
	- Design WTP	Submitted.	Complete		Complete
	- laying of pipelines		Complete		Complete
	- Construction of Office, chlorine and centrifuge buildings.		Complete		Complete
	- raw water pumping and transmission	Pumps procured and installed.	Complete		Complete
	- Treatment Plant programme installation	SCARDA and Programme Logging Control (PLC)	All civil works completed. Waiting	98%	<b>Not sure.</b> The input of engineer is delayed due to

<sup>1</sup> If on-going construction, include %physical progress and expected date of completion

\* Actual completion date deferred due to lockdown (COVID 19) and the PIU (client) will notify officially.

\*\*New completion date was extended till 15<sup>th</sup> November 2018 and now working under Liquidity Damage (LD) period. COVID 19 hampered in labour procurement and input of Commission Engineer, from New Delhi, India due to lockdown and quarantine issues.

			for Commission Engineer (electrical).		COVID19 lockdown.
	b) Approach Road construction & Intake improvement works	<b>Construction of Approach Road &amp; Improvement works at Intake completed and the site handed over to Thromde on 13<sup>th</sup> November 2019.</b>			

## 2. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS<sup>2</sup>

**Table 7: Compliance Status with National Environmental Requirements**

Package No.	Subproject Name	Statutory Environmental Requirements <sup>3</sup>	Status of Compliance <sup>4</sup>	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish <sup>5</sup>
<b>1. Thimphu Thromde</b>	Construction of WWTP	Environment Clearance (EC) required.	EC obtained vide letter No. NECS/FACD/Thimphu-Thromde/2568/2019/1725 dated August 15, 2019.	Valid till August 14, 2024.	None	There are <b>27</b> clauses in the EC to be complied with. Among others Clause 1.11 specifically requires that trees be planted within the WWTP to maintain greenery and improve aesthetic/visual impact of the area.
<b>2. P/ling Thromde</b>	Construction of 46.8 m PSC Box Girder Bridge	EC required.	EC obtained vide letter No. MoWHS/PPD/Env/01/2017/08 dated September 29, 2017.	Valid till 28 September 2020.	None	Bridge construction complete and the site handed over to Thromde in March 2019.
<b>3. Samdrup Jongkhar Thromde</b>	Water Supply	EC required.	<ul style="list-style-type: none"> <li>• EC obtained vide NECS/ESD/Dzo-S/Jongkhar/3208/2015/2544 dated 15 May 2015.</li> <li>• EC renewed vide NECS/EACD/DZO-s-Jongkhar/3208/2018/579 dated May 24, 2018.</li> </ul>	Valid till May 23, 2020.	None	<ul style="list-style-type: none"> <li>• There are <b>nine (9)</b> clauses with sub clauses. Under <b>clause V. Waste Prevention and Management</b>: The holder shall, manage wastes generated from the activities with the application of 4R (Reduce, Reuse, Recycle, Responsibility) principle and other environmentally friendly methods of waste management.</li> </ul>

<sup>2</sup> All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

<sup>3</sup> Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

<sup>4</sup> Specify if obtained, submitted and awaiting approval, application not yet submitted

<sup>5</sup> Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

						<ul style="list-style-type: none"> <li>• Ensure that effective day to day monitoring of EC clauses are carried out by environmental unit or designated environment focal person.</li> <li>• <b>Clause VII</b> warrants that a detailed implementation plan to be submitted to NECS within three (3) months from the date of issue of this EC as per the format attached with EC.</li> </ul> <p>Submit annually the Compliance Report as per the format attached with the EC.</p>
	Approach Road and Intake Improvement works	EC required	<i>(PIU, SJT assumed since it is part of the Water supply project, addition EC is not required.)</i>	EC for Water Supply renewed and valid till May 23, 2020.	None	Same as above and EMP conditions to be applied.

### 3. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

**Table 8:** Compliance Status with Environmental Loan covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required
Schedule 5; Sl.no. 4 Environment	The Borrower shall ensure or cause DES and each of the IAs to ensure that the preparation, design, construction, implementation, operation and decommissioning of the Project, and all Project facilities comply with (a) all the applicable laws and regulations of the Borrower relating to environment, health and safety; (b) the Environmental /safeguards; the EARF; and (d) all measures and requirement set forth in the respective IEEs and EMPs. And any corrective preventive actions set forth in a Safeguard Monitoring Report.	Followed EMPs, but the level of knowledge and capacity to understand and prepare EMPs vary with PIUs and contractors. The quality of EMPs submitted needs to be improved and be more or less consistent with different projects.	1-2 days' of environmental awareness workshop needs to be conducted in the project, as the PIUs and contractors' staff needs to understand the entire concept and principles behind EMP. A half-day EMP preparation exercise by the participants would enable to impart a basic working knowledge to the PIUs and contractors.
	EA and IAs to ensure the preparation, design, construction, implementation, operation and decommissioning of the project, and all subproject facilities comply with; (i) all applicable laws and regulations of the government relating to environment, health,	Complied.	None.

	safety; (ii) the Environmental Safeguards;(iii) EARF; and (iv) all measures and requirements set forth in the respective IEEs and EMPs, and any corrective or preventative actions set forth in a Safeguards Monitoring Report.		
	EA to ensure all bidding documents and contracts for Works contain provisions that require contractors to: - Comply with the measures and requirements relevant to the contractor set forth in the IEE and EMP; and any corrective or preventive actions set out in a Safeguards Monitoring Report.	Complied.	None.
	EA to ensure all bidding documents and contracts for Works contain provisions that require contractors to: - make available a budget for all such environmental measures.	Complied.	None.
	EA to ensure all bidding documents and contracts for Works contain provisions that require contractors to: -provide the EA with a written notice of any unanticipated environmental impacts that arise during construction, implementation or operation of the project that were not considered in the IEE and in the EMP.	Complied.	None.
	EA to ensure all bidding documents and contracts for Works contain provisions that require contractors to: -adequately record the condition of roads, agricultural land and other infrastructure prior to starting to transport materials and construction	These clause was not included in the bidding document.	Noted for future reference. These clauses shall be included in future bidding documents.
	EA to ensure all bidding documents and contracts for Works contain provisions that require contractors to: - fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction.	Complied.  There were no footpaths, agricultural land or other public facilities in the project sites.	None.
	EA to submit semi-annual Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to	Complied.	None.

	affected persons promptly upon submission.		
	EA to ensure that if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP, the RP or the IPP as applicable, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan	Complied.  There were no unanticipated environmental and/or social risks and impacts during construction, implementation.	None.
	EA to report any breach of compliance with the measures and requirements set forth in the EMP, the RP or the IPP promptly after becoming aware of the breach.	Complied.  There was no any breach of compliance with the measures and requirements set forth in the EMP and RP.	None.
	EA to ensure that the contractors comply with all applicable labor, health, and safety laws and regulations of Bhutan and, in particular, do not employ child labor for construction and maintenance activities	Complied. - No child labour engaged. - PPE used. - No forced labor used. Labors paid in full for all works done.	None.
	EA to ensure that the contractors comply with all applicable labor, health, and safety laws and regulations of Bhutan and, in particular, provide appropriate facilities (latrines, etc.) for workers at construction sites.	Complied. - Drinking water and latrines provided in camps. - All safety measures followed as per EMP, including provisions of First Aid Boxes in camps and working sites.	None.

#### 4. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (Refer to EMP Tables in approved IEE/s)

4.1 Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

As per IEE, the contractors are required to submit a Contractor's EMP (CEMP) and site management plan. The CEMP shall be prepared by all contractors before the start of the construction works and shall be approved by PIU. This requirement shall be included in the construction contracts. It shall provide details on specific items related to the environmental aspects during construction. It shall include specifications on requirements for dust control, erosion and sediment control, avoidance of casual standing water, management of solid wastes, workers' camp sanitation, and pollution from oil, grease, fuel spills, and other

materials due to the operation of construction machineries, safety and traffic management, avoidance of inconveniences to the public, air and noise pollution control. It shall also include guidance on the proper design of the construction zone, careful management of stockpiles, vegetation, topsoil, vehicles, and machinery. With the CEMP, PIU can easily verify the associated environmental requirements each time the contractor will request approval for work schedules.

### Package-wise IEE Documentation Status

**Table 9: Package-wise IEE Documentation Status**

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
	Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		
1. Thimphu Thromde: Construction of WWTP.	Completed	Submitted to ADB.	Disclosed on MoWHS website.	No	Monthly EMP submitted by the contractor is approved by the PM, PIU.	The PIU has not shared the final IEE with the contractor.
2. Phuentsholing Thromde: Bridge construction.	Bridge construction completed in March 2019 and the site handed over to Thromde.					
3. S. Jongkhar Thromde: Water Supply	Completed	Submitted to ADB.	Disclosed on MoWHS website.	No	Monthly EMP submitted by the contractor is approved by the PM, PIU.	The PIU has not shared the final IEE with the contractor.
4. Approach Road & Intake Improvement works	Works completed in November 2019 and the site handed over to Thromde on 13 <sup>th</sup> November 2019.					

4.2 For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

### Package-wise Contractor/s' Nodal Persons for Environmental Safeguards

**Table 10: Package-wise Contractor/s' Nodal Persons for Environmental Safeguards**

Package Name	Contractor	Nodal Person	Email Address	Contact Number
1. Thimphu Thromde: Construction of WWTP.	Technofab Engineering Ltd.	Atul Gaur	atul.gaur@technofabengineering.com	77200985
2. P/ling Thromde: Bridge construction.	Work completed in March 2019 and the site handed over to the Thromde.			
3. S. J/khar Thromde: Water Supply	Tundi-Tacho JV	Karma Kinley	kinseldor@gmail.com	77671584
4. Approach Road and Intake Improvement works	Work completed in November 2019 and the site handed over to Thromde on 13 <sup>th</sup> November 2019.			





4.3 With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

**Summary of Environmental Monitoring Activities (for the Reporting Period)<sup>6</sup>**

**Table 11 (a): Summary of Environmental Monitoring Activities  
Component 1: Thimphu Thromde - WWTP**

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>Design Phase &amp; Pre-Construction Phase</b>						
1. Incorporate design measures to minimize environmental impacts	<ul style="list-style-type: none"> <li>Detail design for project conforming to the government's environmental and technical design standards</li> <li>Identify potential disposal sites.</li> </ul>	Included in the designs.	Included in the Contract document.	Bid document.		PM, PIU
<b>Construction Phase</b>						
I) Orientation for Contractors, Workers on environmental management.	<ul style="list-style-type: none"> <li>PIU to conduct awareness training/orientation on implementation of mitigation measures in the EMP.</li> <li>Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents</li> </ul>	Training	Number of trainings conducted.	PIU/ Construction site office.	Not done.	None
II) Drainage and Hydrological Impacts including storm water management.	<ul style="list-style-type: none"> <li>Contractor will implement following measures to minimize the impacts.</li> <li>During construction, the contractor will ensure the proper disposal of spoil and other wastes.</li> <li>All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries.</li> </ul>	Disposed spoils.	Amount of spoils disposed.	--do--	2 – 11- 2020	K.D. Chamling
- Wangchu River falls within the project area. Construction activities can affect/impact the river water quality due to erosion runoff.				Disposal site.	2 – 11- 2020	K.D. Chamling

<sup>6</sup> Attach Laboratory Results and Sampling Map/Locations

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>III) Materials exploitation &amp; management.</b> <ul style="list-style-type: none"> <li>To minimize adverse environmental impacts of borrowing and quarrying</li> </ul>	<ul style="list-style-type: none"> <li>All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries.</li> <li>Covering of materials during transportation and spraying of water along haulage route.</li> </ul>	Materials brought on sight.	Transportation & material purchased challans.	Material stock yard	Daily basis..	PIU
<b>IV) Waste</b> <ul style="list-style-type: none"> <li>Reduce waste generation.</li> <li>Reduce, reuse and recycle waste to reduce contamination due to poor waste disposal practices</li> </ul>	<p>In principle, the waste generation will be minimized at source.</p> <ul style="list-style-type: none"> <li>Waste products will be segregated into biodegradable and non-biodegradable and disposed in Thimphu Thromde's waste collection system.</li> <li>Recycling to be undertaken as far as possible. Examples would include recycling road resurfacing waste as aggregate (e.g. Reclaimed asphalt pavement or reclaimed concrete material) or as a base</li> <li>Any recyclable waste which cannot be reused during construction will be sold to licensed scrap dealers.</li> <li>Residual non-hazardous waste will be disposed-off in the municipal land fill.</li> <li>Construction/workers camps will be provided with sufficient refuse bins.</li> <li>Organic waste such as plant materials will be composted.</li> <li>Animal carcasses will be collected in a timely manner and buried;</li> <li>Disposal of solid wastes into flood ways, wetland, rivers, other watercourses, farmland, forest and associated places of worship or other culturally sensitive areas or areas where a livelihood is derived canals, agricultural fields and public areas will be prohibited. Solid</li> </ul>	No dusts emissions during transportation.	Visual assessment.	During transportation.	Daily basis	PIU
		Amount of waste generated.	Record of wastes generated.	Construction sites and camps.	Daily basis	PIU

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<p>V) Hazardous substances</p> <ul style="list-style-type: none"> <li>• Uses and waste disposal</li> </ul>	<p>waste will only be disposed in Thimphu Thromde's designated areas such as landfills.</p> <ul style="list-style-type: none"> <li>• Sludge removed from storm water drains will be classified as hazardous or non-hazardous waste and disposed in designated landfill sites in accordance with national regulations</li> <li>• Oil and lubricants will be safely stored. Secondary containment around fuel storage area will be ensured.</li> <li>• Controls and standard operating procedures will be developed for the use of fuels and other hazardous substances to prevent spills, accidents and pilferage.</li> <li>• Equipment/vehicle maintenance and refueling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency.</li> <li>• Fuel and other hazardous substances will be stored in safe and isolated areas provided with roof, impervious flooring and bund/containment wall to protect these from the spillage.</li> <li>• Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labeled and safely stored. The spent oil and batteries will be sold to recycling dealers.</li> <li>• Hazardous materials will be stored away from water bodies and above flood level.</li> <li>• Clean-up operation using readily available absorbent such as sawdust will be carried</li> </ul>	<p>Methods of storage</p>	<p>No spillage.</p>	<p>Store/depot.</p>	<p>2 – 11- 2020</p>	<p>KD. Chamling</p>

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
	<p>out immediately during accidental spillage of hazardous waste.</p> <ul style="list-style-type: none"> <li>All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all applicable statutory stipulation.</li> </ul>					
<b>VI) Air quality</b> <ul style="list-style-type: none"> <li>To minimize and reduce fugitive dust emissions and fumes from the construction vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>Water sprinkling / spraying using tanker will be done twice a day or as often as required based on visual observation in order to reduce dust generation.</li> <li>Fuel efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out.</li> <li>All vehicles and machinery used for construction should have valid pollution control certificates (emission tests certificates)</li> <li>Vehicles transporting soil, sand and other loose and fine construction materials shall not be overloaded and will be covered with tarpaulin sheets to reduce the release of dust and avoid impacts from dust. Speed limits of such vehicles within the works site and on unpaved edge areas of the Project road will be established and agreed with the PMU.</li> </ul>	Dust emission.	Visual	Construction sites	2 – 11- 2020	KD Chamling
<b>VII) Noise</b> <ul style="list-style-type: none"> <li>Minimize nuisance to community due to increased noise levels</li> </ul>	<ul style="list-style-type: none"> <li>If noise level exceed the stipulated limits then design and implement noise control measures such as the installation of temporary stationary noise barriers along the</li> </ul>	Noise at site.	Harshness of sound and no complaints from public.	Construction sites.	2 – 11- 2020	KD Chamling

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
VIII) Camps construction and canteen facilities	<p>right of ways, use of equipment with good quality mufflers in working order,</p> <ul style="list-style-type: none"> <li>• Refraining from undertaking construction near schools during school hours or during examination periods,</li> <li>• Inform the residents and institutions of the construction schedule in their vicinity and the likelihood of excess noise during these periods, specifying the anticipated periods during which these impacts will affect them.</li> <li>• In the event, if blasting is required due to unavoidable circumstances, use only non-explosive chemical based blasting material (silent blasting technique) for rock breaking, which will not generate any noise or vibration.</li> </ul>	<ul style="list-style-type: none"> <li>• No blasting required at all.</li> </ul>	IEE and EMP	Work Site	NA	PIU
	<ul style="list-style-type: none"> <li>• Avoid camp construction too close to the local communities to avoid unwanted interference to the way of living of the local communities. Camps location to be consulted with PIU.</li> <li>• Adequate drinking water supply, basic food items, and cooking fuel (such as kerosene) will be provided to ward off competition on local resources.</li> <li>• For maintenance of proper health and hygiene adequate number of pit latrines and garbage cans will be provided.</li> <li>• Fishing, hunting and illegal tree felling will be totally prohibited.</li> <li>• After completion of construction, the abandoned campsite will be cleaned and restored to the original state. If a campsite is a government barren land then contractor will</li> </ul>	<p>Drinking water supplies and electricity provided in camps.</p>	Observation in camps	Camp sites.	2 – 11- 2020	KD Chamling

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>IX) Occupational Health and Safety</b> <ul style="list-style-type: none"> <li>Physical hazards</li> </ul>	<p>carry out compensatory plantation with suitable local or native plant species.</p> <ul style="list-style-type: none"> <li>Routing of traffic to alternative roads where possible</li> <li>Where workers' exposure to traffic cannot be completely eliminated, use of protective barriers to shield workers from traffic vehicles, or installation of channeling devices (e.g. traffic cones and barrels) to delineate work zone</li> <li>Workers shall be provided with appropriate personnel safety equipment such as safety boots, helmets, gloves, reflective jackets, protective clothes, dust mask, goggles, and ear protection at no cost to the workers.</li> <li>Conducting training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees.</li> <li>The contractor will instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities. This will include construction camp rules and site agents/foremen will follow up with toolbox talks on a regular basis.</li> <li>Workers should use safety strap/belts whenever and wherever required.</li> <li>Fencing on all areas of excavation greater than 1m deep shall be done.</li> <li>Contractor will at all-time keep the first aid kit at the construction sites.</li> <li>Contractor will be responsible for evacuation of injured person to the nearest medical center and bear all the medical expenses</li> </ul>	<p>Safety equipment.</p>	<p>Safety gears issued and used.</p>	<p>Sites</p>	<p>2 – 11- 2020 &amp; Daily</p>	<p>KD Chamling PIU</p>

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<ul style="list-style-type: none"> <li><b>Chemical hazards</b></li> </ul>	<ul style="list-style-type: none"> <li>Reflecting signals shall be installed on all construction vehicles and plant.</li> <li>Reduction of engine idling time at construction sites to prevent high accumulation of toxic fumes.</li> <li>Use of extenders or other means to direct exhaust away from the operator.</li> <li>Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel or other solvents</li> <li>Avoiding the use of lead containing paint and using appropriate respiratory protection when removing paints (including those containing lead in older installations) or when cutting galvanized steel.</li> </ul>	Protective clothing	No burns to workers.	Work site.	2 – 11- 2020	KD Chamling
<ul style="list-style-type: none"> <li><b>Public Health and safety</b></li> </ul>	<ul style="list-style-type: none"> <li>Provided safety barriers and proper signage at construction sites.</li> <li>Barriers must be installed to deter pedestrians' access to construction sites, except at designated crossing points.</li> <li>Traffic must be adequately regulated (eg through signs, signals, markings) near critical pedestrian zones or bikeways.</li> <li>Excavated trenches/ditches and freshly cut steep side slopes will be clearly marked and fenced for the safety of passersby and workers alike.</li> <li>Project or construction vehicles will be briefed on speed limit within sensitive areas such as schools, commercial and residential areas.</li> </ul>	Signs and barriers.	No accidents.	Construction sites.	2 – 11- 2020 & Daily	KD Chamling PIU

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<ul style="list-style-type: none"> <li><b>Traffic safety and management</b></li> </ul>	<ul style="list-style-type: none"> <li>In event of accidents, the contractor will be responsible for immediate evacuation of injured person to the nearest medical center. The contractor shall bear medical and other expenses of the injured person.</li> <li>Local communities to be informed about the traffic management measures that will be in place during the period of the construction.</li> </ul>	<ul style="list-style-type: none"> <li>Traffic jams or hindrance to commuters</li> </ul>	<ul style="list-style-type: none"> <li>Use of sign boards, barricades etc.</li> </ul>	<ul style="list-style-type: none"> <li>Work sites.</li> </ul>	2 – 11- 2020	KD Chamling
<b>Operational Phase</b>						
<b>1. Noise</b> - prevent excess noise	<ul style="list-style-type: none"> <li>Noise barrier will be installed if needed in future</li> </ul>	NA	NA	NA	NA	NA
<b>2. Gaseous Emission</b> - prevent air pollution	<ul style="list-style-type: none"> <li>Ensuring that vehicles undertake mandatory pollution checking and maintenance procedures.</li> <li>Undertake air quality monitoring</li> </ul>	NA	NA	NA	NA	NA
<b>3. Particulate emissions</b> - Control level of particulates	<ul style="list-style-type: none"> <li>The road surface will be maintained for smooth traffic flow and reduction of vehicular emission</li> <li>Undertake air quality monitoring</li> </ul>	NA	NA	NA	NA	NA
<b>4. Soil erosion and water pollution</b>	<ul style="list-style-type: none"> <li>Storm water drainage to be maintained and surrounding vegetation to be maintained in good working condition.</li> <li>Routine cleaning of the existing drains and water bodies.</li> </ul>	NA	NA	NA	NA	NA
<b>5. Driving conditions and community safety</b>	<ul style="list-style-type: none"> <li>Zebra crossings to be maintained (clear &amp; visible ).</li> <li>Pedestrian footpath to be properly maintained.</li> </ul>	NA	NA	NA	NA	NA



**Table 11 (b): Summary of Environmental Monitoring Activities  
Component 2: Phuentsholing Thromde – Bridge Construction**

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>Design Phase &amp; Pre-Construction Phase</b>						
1. Incorporate design measures to minimize environmental impacts	<ul style="list-style-type: none"> <li>Detail design for project conforming to the government's environmental and technical design standards</li> <li>Identify potential disposal sites.</li> </ul>	Included in the designs.	Included in the Contract document.	Bid document.	-	PM, PIU
<b>Construction Phase: Bridge construction completed and the site handed over to Thromde.</b>						
<b>Operational Phase</b>						
1. Noise - prevent excess noise	<ul style="list-style-type: none"> <li>Noise barrier will be installed if needed in future</li> </ul>	NA	NA	NA	NA	NA
2. Gaseous Emission - prevent air pollution	<ul style="list-style-type: none"> <li>Ensuring that vehicles undertake mandatory pollution checking and maintenance procedures.</li> <li>Undertake air quality monitoring</li> </ul>	NA	NA	NA	NA	NA
3. Particulate emissions - Control level of particulates	<ul style="list-style-type: none"> <li>The road surface will be maintained for smooth traffic flow and reduction of vehicular emission</li> <li>Undertake air quality monitoring</li> </ul>	NA	NA	NA	NA	NA
4. Soil erosion and water pollution	<ul style="list-style-type: none"> <li>Storm water drainage to be maintained and surrounding vegetation to be maintained in good working condition.</li> <li>Routine cleaning of the existing drains and water bodies.</li> </ul>	NA	NA	NA	NA	NA
6. Driving conditions and community safety	<ul style="list-style-type: none"> <li>Zebra crossings to be maintained (clear &amp; visible ).</li> <li>Pedestrian footpath to be properly maintained.</li> </ul>	NA	NA	NA	NA	NA

**Table 11 (c): Summary of Environmental Monitoring Activities  
Component 3: Samdrup Jongkhar Thromde – Water Supply**

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>Design Phase &amp; Pre-Construction Phase</b>						
1. Incorporate design measures to minimize environmental impacts	<ul style="list-style-type: none"> <li>Detail design for project conforming to the government's environmental and technical design standards</li> <li>Identify potential disposal sites.</li> </ul>	Included in the designs.	Included in the Contract document.	Bid document.		PM, PIU
<b>Construction Phase</b>						
I. Orientation for Contractors, Workers on environmental management.	<ul style="list-style-type: none"> <li>PIU to conduct awareness training/ orientation on implementation of mitigation measures in the EMP.</li> <li>Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents</li> </ul>	Training	Number of trainings conducted.	PIU/ Construction site office.	Not done.	None
II. Drainage and Hydrological Impacts including storm water management.	<ul style="list-style-type: none"> <li>Contractor will implement following measures to minimize the impacts.</li> <li>During construction, the contractor will ensure the proper disposal of spoil and other wastes.</li> <li>All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries.</li> </ul>	Disposed spoils.	Amount of spoils disposed.	--do--	2 – 11- 2020	K.D. Chamling
- Rivers Dungsum Chhu and Rikke chu falls within the project area. Construction activities can affect/impact the river water quality due to erosion runoff.				Disposal site.	Daily	PIU
					Daily	PIU

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>III) Materials exploitation &amp; management.</b>  <ul style="list-style-type: none"> <li>To minimize adverse environmental impacts of borrowing and quarrying</li> </ul> <b>IV) Waste</b> <ul style="list-style-type: none"> <li>Reduce spoils generation.</li> <li>Reduce, reuse and recycle waste to reduce contamination due to poor waste disposal practices</li> </ul>	<ul style="list-style-type: none"> <li>All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries.</li> <li>Covering of materials during transportation and spraying of water along haulage route.</li> </ul> <p>In principle, the waste generation will be minimized at source.</p> <ul style="list-style-type: none"> <li>Waste products will be segregated into biodegradable and non-biodegradable and disposed in SJ Thromde's waste collection system.</li> <li>Recycling to be undertaken as far as possible. Examples would include recycling road resurfacing waste as aggregate (e.g. Reclaimed asphalt pavement or reclaimed concrete material) or as a base</li> <li>Any recyclable waste which cannot be reused during construction will be sold to licensed scrap dealers.</li> <li>Residual non-hazardous waste will be disposed-off in the municipal land fill.</li> <li>Construction/workers camps will be provided with sufficient refuse bins.</li> <li>Organic waste such as plant materials will be composted.</li> <li>Animal carcasses will be collected in a timely manner and buried;</li> <li>Disposal of solid wastes into rivers, forests, culturally sensitive areas, agricultural fields and public areas will be prohibited. Solid waste will only be disposed in Thromde's designated areas such as landfills.</li> </ul>	<p>Materials brought on sight.</p> <p>No dusts emissions during transportation.</p> <p>Amount of waste generated.</p>	<p>Transportation &amp; material purchased challans.</p> <p>Visual assessment.</p> <p>Record of wastes generated.</p>	<p>Material stock yard</p> <p>During transportation.</p> <p>Construction sites and camps.</p>	<p>Daily</p> <p>Daily.</p>	<p>PIU</p> <p>PIU</p>

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>V) Hazardous substances</b> <ul style="list-style-type: none"> <li>• Uses and waste disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Oil and lubricants will be safely stored. Secondary containment around fuel storage area will be ensured.</li> <li>• Equipment/vehicle maintenance and refueling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency.</li> <li>• Fuel and other hazardous substances will be stored in safe and isolated areas provided with roof, impervious flooring and bund/containment wall to protect these from the spillage.</li> <li>• Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labeled and safely stored. The spent oil and batteries will be sold to recycling dealers.</li> <li>• Hazardous materials will be stored away from water bodies and above flood level.</li> <li>• Clean-up operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste.</li> <li>• All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all applicable statutory stipulation.</li> </ul>	Methods of storage	No spillage.	Store/depot.	Daily	PIU
<b>VI) Air quality</b>	<ul style="list-style-type: none"> <li>• Water sprinkling / spraying using tanker will be done twice a day or as often as required</li> </ul>	Dust emission.	Visual	Construction sites	Daily	PIU

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<ul style="list-style-type: none"> <li>To minimize and reduce fugitive dust emissions and fumes from the construction vehicles.</li> </ul>	<p>based on visual observation in order to reduce dust generation.</p> <ul style="list-style-type: none"> <li>Fuel efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out.</li> <li>All vehicles and machinery used for construction should have valid pollution control certificates (emission tests certificates)</li> <li>Vehicles transporting soil, sand and other loose and fine construction materials shall not be overloaded and will be covered with tarpaulin sheets to reduce the release of dust and avoid impacts from dust.</li> <li>Speed limits of such vehicles within the works site will be established and agreed with the PMU.</li> </ul>					
<b>VII) Noise</b> <ul style="list-style-type: none"> <li>Minimize nuisance to community due to increased noise levels</li> </ul>	<ul style="list-style-type: none"> <li>If noise level exceed the stipulated limits then design and implement noise control measures such as the installation of temporary stationary noise barriers along the right of ways, use of equipment with good quality mufflers in working order,</li> <li>Refraining from undertaking construction near schools during school hours or during examination periods,</li> <li>Inform the residents and institutions of the construction schedule in their vicinity and the likelihood of excess noise during these periods, specifying the anticipated periods during which these impacts will affect them.</li> </ul>	Noise at site.	Harshness of sound and no complaints from public.	Construction sites.	Daily	PIU
<b>VIII) Camps construction and canteen facilities</b>	<ul style="list-style-type: none"> <li>Avoid camp construction too close to the</li> </ul>	Drinking water supplies and	Observation of camps	Camp sites.	Daily	PIU

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>IX) Occupational Health and Safety</b> <ul style="list-style-type: none"> <li>Physical hazards</li> </ul>	<p>local communities to avoid unwanted interference to the way of living of the local communities. Camps location to be consulted with PIU.</p> <ul style="list-style-type: none"> <li>Adequate drinking water supply, basic food items, and cooking fuel (such as kerosene) will be provided to ward off competition on local resources.</li> <li>For maintenance of proper health and hygiene adequate number of pit latrines and garbage cans will be provided.</li> <li>Fishing, hunting and illegal tree felling will be totally prohibited.</li> <li>After completion of construction, the abandoned campsite will be cleaned and restored to the original state with appropriate bioengineering works using local plant species.</li> </ul>	<p>electricity provided in camps.</p>				
	<ul style="list-style-type: none"> <li>Routing of traffic to alternative roads where possible</li> <li>Where workers' exposure to traffic cannot be completely eliminated, use of protective barriers to shield workers from traffic vehicles, or installation of channeling devices (e.g. traffic cones and barrels) to delineate work zone</li> <li>Workers shall be provided with appropriate personnel safety equipment such as safety boots, helmets, gloves, reflective jackets, protective clothes, dust mask, goggles, and ear protection at no cost to the workers.</li> <li>Conducting training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees.</li> </ul>	<p>Safety equipment.</p>	<p>Safety gears issued and used.</p>	<p>Sites</p>	<p>Daily</p>	<p>PIU</p>

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<ul style="list-style-type: none"> <li>• <b>Chemical hazards</b></li> </ul>	<ul style="list-style-type: none"> <li>• The contractor will instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities. This will include construction camp rules and site agents/foremen will follow up with toolbox talks on a regular basis.</li> <li>• Workers should use safety strap/belts whenever and wherever required..</li> <li>• Fencing on all areas of excavation greater than 1m deep shall be done.</li> <li>• Contractor will at all-time keep the first aid kit at the construction sites.</li> <li>• Contractor will be responsible for evacuation of injured person to the nearest medical center and bear all the medical expenses</li> <li>• Reflecting signals shall be installed on all construction vehicles and plant.</li> <li>• Reduction of engine idling time at construction sites to prevent high accumulation of toxic fumes.</li> <li>• Use of extenders or other means to direct exhaust away from the operator.</li> <li>• Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel or other solvents</li> <li>• Avoiding the use of lead containing paint and using appropriate respiratory protection when removing paints (including those containing lead in older installations) or when cutting galvanized steel.</li> </ul>					
	<ul style="list-style-type: none"> <li>• Provided safety barriers and proper signage at construction sites.</li> </ul>			Work site.	Daily	PIU





Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>1. Noise</b> - prevent excess noise	<ul style="list-style-type: none"> <li>Noise barrier will be installed if needed in future</li> </ul>	NA	NA	NA	NA	NA
<b>2. Gaseous Emission</b> - prevent air pollution	<ul style="list-style-type: none"> <li>Ensuring that vehicles undertake mandatory pollution checking and maintenance procedures.</li> <li>Undertake air quality monitoring</li> </ul>	NA	NA	NA	NA	NA
<b>3. Particulate emissions</b> - Control level of particulates	<ul style="list-style-type: none"> <li>The road surface will be maintained for smooth traffic flow and reduction of vehicular emission</li> <li>Undertake air quality monitoring</li> </ul>	NA	NA	NA	NA	NA
<b>4. Soil erosion and water pollution</b>	<ul style="list-style-type: none"> <li>Storm water drainage to be maintained and surrounding vegetation to be maintained in good working condition.</li> <li>Routine cleaning of the existing drains and water bodies.</li> </ul>	NA	NA	NA	NA	NA
<b>7. Driving conditions and community safety</b>	<ul style="list-style-type: none"> <li>Zebra crossings to be maintained (clear &amp; visible).</li> <li>Pedestrian footpath to be properly maintained.</li> </ul>	NA	NA	NA	NA	NA

### Overall Compliance with CEMP/ EMP

**Table 12:** Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required
1	WWTP	Yes	Yes	Satisfactory	None
2	Bridge	None as construction of bridge is completed and handed over to Thromde.			
3	Water Supply	All works completed but waiting for the engineer to join and startup the auto-commission system. Contractor has demobilized his labourers and all restoration works carried out satisfactorily. The project is not handed over to Thromde.			
4	Approach Road and Intake Improvement works	Works completed and handed over to Thromde.			

## 5. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

- 5.1 Briefly describe the approach and methodology used for environmental monitoring of each sub-project.

The approach used for environmental monitoring is a continuous one. An EMP is attached, as part of the project document, which the contractor is mandated to comply with. Therefore, the contractor is responsible for the daily monitoring of the ongoing activities. The PIU and the Environmental Officer of the Thromde are required to monitor the project activities on a regular basis, as and when required. Further, environmental monitoring is also carried out by the Environment Officers from National Environment Commission Secretariat once or twice during the project period. They make 'surprise' visits to the project sites. As part of the project requirement Semi-annual Environment Monitoring Report (SEMR) is prepared and submitted to ADB. This report is prepared by Design Monitoring Supervision Consultants (DMSC), of Progressive Research & Consultancy Services (PRCS) for the client. The overall monitoring of the project is then carried out by the environment safeguard specialist of DMSC during field visits. Any lapses, improvements and rectifications are recommended at site to the PIU and contractor.

## 6. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY AND NOISE LEVELS)

- 6.1 Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:
- Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
    - No dust was seen escaping the site as water was sprayed wherever it was required.

- Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
  - No muddy water was seen escaping the site boundaries or on adjacent roads.
- Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain;
  - No erosion and sedimentations observed at site as the works are carried out during dry period and hence the erosion and sediment control measures are not needed and thus not installed.
- Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
  - All construction works are complete.
- Confirm spill kits on site and site procedure for handling emergencies.
  - Contractors have first-aid kits at site and for emergency medical evacuation, they have vehicles and on the worst case scenario there are taxis available to reach the patients to hospitals, as the work sites are within 5-km radius.
- Identify any chemical stored on site and provide information on storage condition. Attach photograph.
  - No chemical stored at site.
- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
  - During the site visits all civil construction works (civil) are over, with two components already completed and sites handed over to client. Hence, it is not a concern anymore..
- Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
  - The solid waste quantity generated is negligible whereas there is hardly anything of liquid waste generation in the project activity.
- Provide information on barricades, signage, and on-site boards. Provide photographs in the Appendix.
  - Barricades and signage have been erected at site.
- Indicate if there are any activities being under taken out of working hours and how that is being managed.
  - No activities being undertaken out of working hours. All works are complete.
- Briefly discuss the basis for environmental parameters monitoring.

The IEE reflects the environmental parameters monitoring requirements. Parameters to be monitored are reflected in the IEE through the preparation and implementation of EMP and CEMP. The bidding documents include all requirements to be executed by the contractor according to the conditions and clauses in the document. The contractor uses this document to execute his works.

- Indicate type of environmental parameters to be monitored and identify the location.

There are a number of parameters to be monitored during the project implementation. These are air quality, noise pollution, water effluent quality besides other OHS requirements and labour conditions. These parameters are to be monitored based on EMP and CEMP at work sites.

- Indicate the method of monitoring and equipment used.

Monitoring is done mainly through the PIU during work supervisions regularly at site. All day-to-day monitoring at constructions site is the responsibility of the contractor. The PMU is responsible of overall monitoring works. The DMSC environment and social safeguards specialists will carry out the overall monitoring of the project activities during the field visits while preparing the SEMR.

- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements.

No analysis of air quality and noise quality has been carried out so far, except for water quality and effluent parameters for WWTP. For some reasons it is not clearly spelt out who is responsible to carry out these, as these require additional budget for purchase and use of equipment. Budget has not been kept for these including local trainings, awareness on HIV/AIDS, EMP/CEMP and OHS etc. However, most of these are addressed through the implementation of EMP/CEMP till date.

*As a minimum the results should be presented as per the tables below.*

#### Air Quality Results<sup>7</sup>

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3
Project	Not done	-	-	-	-
-	-	-	-	-	-

#### Water Quality Results

**Table 13:** Effluent water (Project site Inlet) WWTP, Thimphu Thromde

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L
1	28.01.2017 (9.00 a.m.)	Project site Inlet	6.79	Not analysed.	201.77	201.84	21.67	15.33
2	28.01.2017 (2.00 p.m.)	Project site Inlet						
3	28.01.2017 (4.00 p.m.)	Project site Inlet						

**Note:** Only in WWTP Effluent water (raw sewage water from Project site Inlet) has been collected and analysed. Three samples, in a single day, have been taken and analysed and averaged in the table above. The entire report has been annexed as **Annex 4-Page 50**. Once the WWTP is commissioned the effluent water quality will be generated automatically.

<sup>7</sup>No monitoring and analysis of Air Quality results have been carried out.

**Noise Quality Results<sup>8</sup>**

Site No.	Date of Testing	Site Location	LA <sub>eq</sub> (dBA) (Government Standard)		Remarks
			Day Time	Night Time	
WWTP	Not done*	-	75	65	Industrial area
			65	55	Mixed area
			55	45	Sensitive area

**Note:** \* These tests have not been carried out. However there are National Standards which have been annexed as **Appendix C: Environmental Criteria and Standards**.

## 7. GRIEVANCE REDRESS MECHANISM

- 7.1 Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

To address any grievance received Thimphu Thromde has constituted the following mechanism.

**First tier of GRM:** A designated locally elected thromde representative shall be the channel through which complaints shall be lodged. Thereafter the PIU is the first tier of GRM which offers the fastest and most accessible mechanism for resolution of grievances. The Project Managers (PM/PIU) will be designated as the key officer for grievance redress. Resolution of complaints will be done within seven working (7) days. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, police, etc.) Grievances will be documented and personal details (name, address, date of complaint, etc.) will be included unless the person complaining requests for anonymity.

A tracking number shall be assigned for each grievance, including the following elements; (i) initial grievance sheet (including the description of the grievance), with an acknowledgement of receipt handed back to the complainant when the complaint is registered; (ii) grievance monitoring sheet, mentioning actions taken (investigation, corrective measures); (iii) closure sheet, one copy of which will be handed to the complainant after he/she has agreed to the resolution and signed-off. The updated register of grievances and complaints will be available to the public at the Thromde office. Should the grievance remain unresolved it will be escalated to the second tier.

**Second Tier of GRM:** The PM of respective sub-projects will activate the second tier of GRM by referring the unresolved issue (with written documentation) to Thromde Office who will pass unresolved complaints upward to the Grievance Redress Committee (GRC). The GRC shall be established by Thimphu Thromde before commencement of site works. The GRC will consist of the following persons: (i) Executive Secretary; (ii) Division Heads of Thimphu Thromde; (iii) Environmental Officer (iv) Project Coordinator; (v) Elected representative of the affected person(s); and (vi) representative of the Thromde Land Record Officer. A hearing will be called with the GRC, if necessary, where the affected person can present his/her concern/issues. The process will facilitate resolution through mediation. The local GRC will meet as necessary when there are grievances to be addressed. The local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within fifteen (15) working days. The contractor will have observer status on the committee. If unsatisfied with the decision, the existence of the

<sup>8</sup>No monitoring and analysis of Noise Quality Results have been carried out.

GRC shall not impede the complainant's access to the Government's judicial or administrative remedies.

The functions of the local GRC with regards to environmental concerns are as follows: (i) resolve problems and provide support to affected persons arising from various environmental issues including issues; hampering conduct of business, utilities, power and water supply, waste disposal, traffic interference and public safety; (ii) reconfirm grievances of affected persons, categorize and prioritize them and aim to provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

The environment officer or the land record officer in Thimphu Thromde will be responsible for processing and placing all papers before the GRC, maintaining database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out.

**Third tier of GRM:** In the event that a grievance cannot be resolved directly by the GRC the affected person can seek alternative redress through an appropriate court. The GRC will be kept informed by the Thromde authority. The monitoring reports shall include the following aspects pertaining to progress on grievances: (i) Number of cases registered with the GRC, level of jurisdiction, number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as Name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues and status of grievance.

## 8. COMPLAINTS RECEIVED DURING THE REPORTING PERIOD

- 8.1 Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

The project has not received any grievance so far.

## 9. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- 9.1 Summary of follow up time-bound actions to be taken within a set timeframe.

Till 2<sup>nd</sup> November 2020, all the packages have been awarded and works are in progress and nearing completion. Two packages (Bridge construction and Approach Road construction & Improvement works at Intake) are completed and already handed over to the client. Other packages are nearing completion with 98% progress. The work progress of some activities under each component are varied and tabulated below. The delay has been due to COVID19 pandemic as some equipment and experts have not arrived at site. **Table 14** (below) shows the project packages, starting date of implementation, schedule date of completion etc. along with physical progress.

**Table 14:** Sub-project status

Sl. No	Lot No. (Package 1)	Location/ Area of Activities	Starting date of Implementation	Actual months of completion	Actual date of completion	Physical progress (%) as on 2 November 2020
1	Component 1:	Babesa LAP,	10/Nov/2016	30	9/May/2019	98%

	<b>-WWTP</b>	Thimphu				
2	Component 2: - <b>Bridge</b>	Over Om Chhu, near Youth Center, Phuentsholing.	17/August/2017	18	17/Feb/2019	Completed in March 2019.
3	Component 3: - <b>Water supply</b>	Rikkechhu at 4 km North of Samdrup Jongkhar Town (Char kilo), S. Jongkhar	1/5/2016	18	Extended till 15- Nov-2018*	98%
4	Approach Road & Intake Improvement works	Rikkechhu at 4 km North of Samdrup Jongkhar Town ( (Char kilo), S. Jongkhar	28/3/2019	3	13 – Nov - 2019	Completed in November 2019.

*\*six months' time extension given and the new date of completion corresponds to 15<sup>th</sup> November 2018. Currently the contractor is on Liquidity Damage period. The balance 2% works will be commissioning the auto-commission system, provide operation and maintenance guidelines and train the Thromde staff. The identified engineer is yet to join the project due to lockdown (COVID 19) and quarantine issues.*

## 10. APPENDICES

### a) Appendices


- i. Environmental Clearance
- ii. Compliance Report Format
- iii. Detailed Implementation Plan Format

### b) Photographs


### c) Environmental Criteria and Standards

## a) Appendices

## Annex 1: Environmental Clearance – WWTP at Babesa, Thimphu Thromde



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**National Environment Commission**  
 Royal Government of Bhutan



NECS/EACD/Thimphu-Thromde/2568/2019/1725

August 15, 2019


**Environmental Clearance**

In accordance with Section 34.1 of the Environmental Assessment Act 2000 and Section 34 of the Water Act of Bhutan 2011, this Environmental Clearance (EC) is hereby renewed to Thimphu Thromde Administration for installation and operation of wastewater treatment plant (WWTP) at Babesa under Thimphu Thromde with the following terms and conditions:

**I. General**

The holder shall:

1. Comply with provisions of the National Environment Protection Act 2007, Environmental Assessment Act 2000 and Regulation for Environmental Clearance of Projects 2016 (RECOP 2016), Waste Prevention & Management Act of Bhutan 2009 and its Regulation 2012 (Amendment 2016), The Water Act of Bhutan 2011 and its Regulation 2014 and Revised Regulation on the Control of Ozone Depleting Substances (ODS) 2008;
2. Ensure that installation and operation of waste water treatment plant is in line with the Initial Environmental Examination report submitted for EC;
3. Ensure that local communities, properties and any religious, cultural, historic and ecologically important sites are not adversely affected by the installation and operation of the waste water treatment plant;
4. Restore the damage of any public or private properties caused by the installation and operation of the waste water treatment plant;
5. Inform NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance;
6. erect a signboard at the take-off point of the main entry of the WWTP stating the its name and contact address;
7. ensure that the existing WWTP is fully decommissioned and converted into recreational area once the new WWTP is commissioned as stated in the application;
8. ensure that the technology adopted for the WWTP is of Intermittent Decanted Aerated Lagoon, which is equivalent to Sequential Batch Reactor as stated in the application;
9. Ensure that no foul odour is emitted from the WWTP;
10. Ensure general housekeeping, cleanliness, and hygiene are maintained at all times in the WWTP; and
11. Ensure that trees are planted within the WWTP premises upon consultation with Department of Forest and Park Services to maintain greenery and improve aesthetic/visual impact on the area.

  
 NEC, PO Box 466, Thimphu, Bhutan  
 Tel: (975-2) 323384/325856/324323/326993 Fax: (975-2) 323385



## **II. Environmental standards**

The holder shall comply with the existing Environmental Standards 2010.

## **III. Import and use of secondhand equipment and ODS**

The holder shall:

1. not import and use secondhand equipment and machineries; and
2. not use ODS as per the Revised Regulation on the Control of ODS 2008.

## **IV. Water use and management**

The holder shall:

1. ensure that proposed activity does not disrupt the water flow and pollute the water bodies; and
2. ensure that 30 meter or 100 feet buffer is maintained from the water resources at all times.

## **V. Waste prevention and management**

The holder shall:

1. manage wastes generated from the installation and operation of waste water treatment plant (labour camps, offices, etc.) with the application of 4R (Reduce, Reuse, Recycle, Responsibility) principle and other environmentally friendly methods of waste management; and
2. ensure that import and use of hazardous wastes are strictly prohibited.

## **VI. Management of excavated materials and run-off**

The holder shall:

1. ensure that all excavated materials generated are re-used or disposed within the premises as stated in the application; and
2. put appropriate measures to avoid erosion and landslides.

## **VII. Implementation plan**

The holder shall prepare a detailed implementation plan focusing on the implementation of terms and conditions of this EC and submit to NECS within three (03) months from the date of issue of this EC as per the reporting format attached herewith.

## **VIII. Monitoring and reporting**

The holder shall:

1. ensure that the effective day-to-day monitoring of the EC terms and conditions are carried out by the environmental unit or designated environmental focal person; and
2. maintain proper records of effluent discharges and submit quarterly reports to NECS.

## **IX. Renewal and modification**

The holder shall:



1. ensure that renewal of this EC is processed at least three months prior to its expiry along with a copy of EC and a report on the implementation of its terms and conditions as per the format attached, failing which the applicant shall be liable for penalty as per the RECOP 2016; and
2. obtain prior approval from NECS for any modification to the existing proposal/application.

**Reservation**

1. The NECS may stop the activity or impose additional terms and conditions, as may be deemed necessary; and
2. The EC shall be subject to periodic review and modifications as per Article 25 of the EA Act 2000, without any liability on the part of the Royal Government.

The holder may adopt best practices in executing these terms and conditions to avoid adverse environmental impacts.

**Failure to comply with any of the above terms and conditions shall constitute an offence and the proponent shall be liable in accordance to the Environmental Assessment Act 2000 and/or existing environmental laws.**

**Validity:**

This EC is renewed with validity from **August 15, 2019 until August 14, 2024** for installation and operation of wastewater treatment plant with an installed capacity of **12 Million Liters Per Day** only.

(Phento Tshering)  
**DIRECTOR**




To,  
Mr. Kinlay Penjore  
Project Manager, ADB  
Thimphu Thromde

**Copy to:**

1. Dzongkhag Environment Officer, Dzongkhag Administration, Thimphu Dzongkhag for necessary compliance monitoring;
2. Guard File (2568) EACD, NECS for record.

**Annex – 2: Environmental Clearance – Bridge Construction, Phuentsholing  
Thromde**


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**ROYAL GOVERNMENT OF BHUTAN**  
**MINISTRY OF WORKS & HUMAN SETTLEMENT**  
**THIMPHU: BHUTAN**

*"Construction Industry: Solutions through innovation and improved technology"*  
 MoWHS/ PPD/Env/01/2017/ འུཾ September 29, 2017

**Environmental Clearance**

In accordance with Section 34.1 of the Environmental Assessment Act 2000 and Section 34 of the Water Act 2011, this Renewal of Environmental Clearance (EC) is hereby issued to Dasho Thrompon, Phuentsholing Thromde for the construction of Bridge over Omchu, Phuentsholing Thromde under Chukha Dzongkhag with the following terms and conditions:

**I. General**  
 The holder shall:

1. comply with provisions of the National Environment Protection Act 2007, Environmental Assessment Act 2000 and its Regulation 2016, Waste Prevention & Management Act of Bhutan 2009 and its Regulation 2016, and Water Act of Bhutan 2011 and its Regulation 2014;
2. ensure that construction activities are in line with Initial Environmental Examination report submitted for EC;
3. ensure that local communities, properties and any religious, cultural, historic and ecologically important sites are not adversely affected by the activities;
4. restore the damage of any public or private properties caused by the activities;
5. inform the Ministry of Works and Human Settlement (MoWHS) and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance; and
6. erect a signboard at the main entry of the project site stating the name of the activities and contact address.

**II. Environmental standards**  
 The holder shall comply with the existing Environmental Standards.

**III. Import and use of secondhand equipment**  
 The holder shall ensure that import and use secondhand equipment and machineries are strictly prohibited.

**IV. Water use and management**  
 The holder shall:

1. ensure that activities does not disrupt the water flow and pollute the water bodies during and after construction; and

Tele: 00975-2-327998/328173/326793/322182/325171  
 Fax: 00975-2-323121  
 Po Box: 791

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 ROYAL GOVERNMENT OF BHUTAN  
 MINISTRY OF WORKS & HUMAN SETTLEMENT  
 THIMPHU: BHUTAN

*"Construction Industry: Solutions through innovation and improved technology"*

2. ensure that the downstream affects are monitored at all times to ensure that no damage is caused due to the project activity.

**V. Waste prevention and management**

The holder shall:

1. manage wastes generated from the activities (activity site, labour camps, offices etc.) with the application of 4R (Reduce, Reuse, Recycle, Responsibility) principle and other environmentally friendly methods of waste management; and
2. ensure that import and use of hazardous wastes are strictly prohibited.

**VI. Management of excavated materials and run-off**

The holder shall:

1. dispose off excess excavated materials at the pre-identified approved dumpsite only. Construction spoils must not be allowed to contaminate watercourses; and
2. put appropriate measures to avoid erosion and landslides.

**VII. Implementation plan**

The holder shall prepare a detailed implementation plan focusing on the implementation of terms and conditions of this EC and submit to PPD, MoWHS within three (03) months from the date of issue of this EC.

**VIII. Monitoring and reporting**

The holder shall ensure that the effective day-to-day monitoring of the EC terms and conditions are carried out by the environmental unit or designated environment focal person;

**IX. Renewal and modification**

The holder shall:

1. ensure that renewal of this EC is processed at least three (03) months prior to its expiry along with a copy EC and a report on the implementation of its terms and conditions; and
2. obtain prior approval from MoWHS for any modification to the existing proposal/application.

**Reservation**

1. The MoWHS may stop the activity or impose additional terms and conditions, as may be deemed necessary; and

Tele: 00975-2-327998/328173/326793/322182/325171

Fax: 00975-2-323121

Po Box: 791



དཔལ་ལྷན་འབྲུག་གཞུང་། འབྲུག་རྒྱལ་ཁབ་

ROYAL GOVERNMENT OF BHUTAN  
MINISTRY OF WORKS & HUMAN SETTLEMENT  
THIMPHU: BHUTAN

*"Construction Industry: Solutions through innovation and improved technology"*

2. ensure that the downstream affects are monitored at all times to ensure that no damage is caused due to the project activity.

**V. Waste prevention and management**

The holder shall:

1. manage wastes generated from the activities (activity site, labour camps, offices etc.) with the application of 4R (Reduce, Reuse, Recycle, Responsibility) principle and other environmentally friendly methods of waste management; and
2. ensure that import and use of hazardous wastes are strictly prohibited.

**VI. Management of excavated materials and run-off**

The holder shall:

1. dispose off excess excavated materials at the pre-identified approved dumpsite only. Construction spoils must not be allowed to contaminate watercourses; and
2. put appropriate measures to avoid erosion and landslides.

**VII. Implementation plan**

The holder shall prepare a detailed implementation plan focusing on the implementation of terms and conditions of this EC and submit to PPD, MoWHS within three (03) months from the date of issue of this EC.

**VIII. Monitoring and reporting**

The holder shall ensure that the effective day-to-day monitoring of the EC terms and conditions are carried out by the environmental unit or designated environment focal person;

**IX. Renewal and modification**

The holder shall:

1. ensure that renewal of this EC is processed at least three (03) months prior to its expiry along with a copy EC and a report on the implementation of its terms and conditions; and
2. obtain prior approval from MoWHS for any modification to the existing proposal/application.

**Reservation**


1. The MoWHS may stop the activity or impose additional terms and conditions, as may be deemed necessary; and

Tele: 00975-2-327998/328173/326793/322182/325171

Fax: 00975-2-323121

Po Box: 791





དཔལ་ལྷན་འབྲུག་གཞུང་། འབས་ཁྲིལ་ལྷན་ཁག།  
 ROYAL GOVERNMENT OF BHUTAN  
 MINISTRY OF WORKS & HUMAN SETTLEMENT  
 THIMPHU: BHUTAN

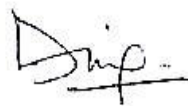
*"Construction Industry: Solutions through innovation and improved technology"*

2. The EC shall be subject to periodic review and modifications as per Article 25 of the EA Act 2000, without any liability on the part of the Royal Government.

The holder may adopt best practices in executing these terms and conditions to avoid adverse environmental impacts.

Failure to comply with any of the above terms and conditions shall constitute an offence and the proponent shall be liable in accordance to the Environmental Assessment Act 2000 and/or existing environmental laws.

**Validity:**  
 This EC is issued with valid from September 29, 2017 until September 28, 2020 for the construction of Bridge over Omchu under Phuntsholing Thromde only.

  
 (Dorji Wangmo)  
 Chief Planning Officer

To,  
 Dasho Thrompon  
 Phuntsholing Thromde  
 Chukha


**Copy to:**

1. Hon'ble Secretary, MoWHS for kind information
2. Executive Secretary, Phuntsholing Thromde for kind information
3. Chief Environment Officer, Environmental Services Division for information.
4. Environment Officer, Phuntsholing Thromde for necessary action.


---

Tele: 00975-2-327998/328173/326793/322182/325171  
 Fax: 00975-2-323121  
 Po Box: 791

**Annex – 3: (a) Environmental Clearance – Water Supply, Samdrup Jongkhar Thromde**



ཀྲུལ་ཡོངས་མཐའ་ལོའོར་གནས་སྤངས་ལྷན་ཚོགས།  
 དཔལ་ལྷན་འབྲུག་གཞུང་།  
**National Environment Commission**  
 Royal Government of Bhutan



NECS/EACD/Dzo-S-Jongkhar/3208/2018/ 579 May 24, 2018

**Environmental Clearance**

In accordance with Section 34.1 of the Environmental Assessment Act 2000 and Section 34 of the Water Act 2011, this Environmental Clearance (EC) is hereby renewed to Executive Secretary, Samdrup Jongkhar Thromde for the rehabilitation of water supply within Samdrup Jongkhar Tromde with the following terms and conditions:

**I. General**  
 The holder shall:

1. comply with provisions of the National Environment Protection Act 2007, Environmental Assessment Act 2000 and its Regulation 2016, Waste Prevention & Management Act of Bhutan 2009 and its Regulation 2016, and The Water Act of Bhutan 2011 and its Regulation 2014;
2. ensure that the operation of plant is in line with Initial Environmental Examination report submitted for EC;
3. ensure that local communities, properties and any religious, cultural, historic and ecologically important sites are not adversely affected by the development and operation of plant;
4. restore the damage of any public or private properties caused by the development and operation of the plant;
5. inform NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance; and
6. erect a signboard at the take-off point of the main entry of the plant stating the name of the plant and contact address.


**II. Environmental standards**  
 The holder shall comply with the existing Environmental Standards.

**III. Import and use of secondhand equipment and ODS**  
 The holder shall:

1. ensure that import and use 'secondhand equipment and machineries are strictly prohibited; and
2. ensure that import and use ODS are in line with the Revised Regulation on the Control of ODS 2008.

**IV. Water use and management**  
 The holder shall:

*Env. officer*



DIARY NO. 1678

RECEIVED 31.05.18

MARKED BY SC



1. abide by the water use priorities under the Water Act of Bhutan 2011 and no claim or compensation against or government or any person(s) shall be made for consequences arising thereon; and
2. ensure that activity does not disrupt the water flow and pollute the water bodies.

#### **V. Waste prevention and management**

The holder shall:

1. manage wastes generated from the project (Industrial site, labour camps, offices etc.) with the application of 4R (Reduce, Reuse, Recycle, Responsibility) principle and other environmentally friendly methods of waste management; and
2. ensure that import and use of hazardous wastes are strictly prohibited.

#### **VI. Management of excavated materials and run-off**

The holder shall:

1. dispose off excess excavated materials at the pre-identified approved dumpsite; and
2. put appropriate measures to avoid erosion and landslides.

#### **VII. Implementation plan**

The holder shall prepare a detailed implementation plan focusing on the implementation of terms and conditions of this EC and submit to NECS within three (03) months from the date of issue of this EC.

#### **VIII. Monitoring and reporting**

The holder shall:

1. ensure that the effective day-to-day monitoring of the EC terms and conditions are carried out by the environmental unit or designated environment focal person;
2. maintain proper records on wastes generated and its management, stating types (industrial and general wastes), quantities and characteristic and submit to NECS annually; and
3. maintain records of water used in the plant (separately for industrial and domestic purposes) and amount discharged and submit it to NECS quarterly.

#### **IX. Renewal and modification**

The holder shall:

1. ensure that renewal of this EC is processed at least three months prior to its expiry along with a copy EC and a report on the implementation of its terms and conditions; and
2. obtain prior approval from NECS, for any modification to the existing proposal/application.

#### **Reservation**

1. The NECS may stop the activity or impose additional terms and conditions, as may be deemed necessary; and
2. The EC shall be subject to periodic review and modifications as per Article 25 of the EA Act 2000, without any liability on the part of the Royal Government.



1. abide by the water use priorities under the Water Act of Bhutan 2011 and no claim or compensation against or government or any person(s) shall be made for consequences arising thereon; and
2. ensure that activity does not disrupt the water flow and pollute the water bodies.

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3. maintain records of water used in the plant (separately for industrial and domestic purposes) and amount discharged and submit it to NECS quarterly.

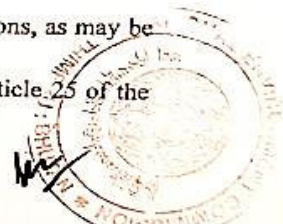
#### **IX. Renewal and modification**

The holder shall:

1. ensure that renewal of this EC is processed at least three months prior to its expiry along with a copy EC and a report on the implementation of its terms and conditions; and
2. obtain prior approval from NECS, for any modification to the existing proposal/application.

#### **Reservation**

1. The NECS may stop the activity or impose additional terms and conditions, as may be deemed necessary; and
2. The EC shall be subject to periodic review and modifications as per Article 25 of the EA Act 2000, without any liability on the part of the Royal Government.



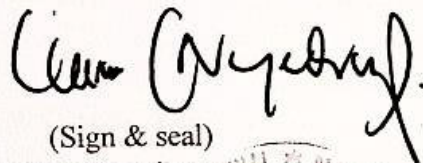


The holder may adopt best practices in executing these terms and conditions to avoid adverse environmental impacts.

**Failure to comply with any of the above terms and conditions shall constitute an offence and the proponent shall be liable in accordance to the Environmental Assessment Act 2000 and/or existing environmental laws.**

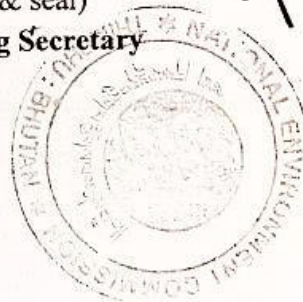
**Validity:**

This EC is issued with valid from **May 24, 2018** until **May 23, 2020** for the rehabilitation of water supply within Samdrup Jongkhar Tromde.



(Sign & seal)

**Officiating Secretary**



To,  
Executive Secretary,  
✓ **Samdrup Jongkhar Tromde**

**Copy to:**

1. The Environment Officer, Dzongkhag Administration, Samdrup Jongkhar for information and necessary action.
2. Guard-file, Dzo-S-Jongkhar, NECS for record.

### (b) Compliance Report Format

## Compliance Report

## 1. General Information

- 1.1. Name of the activity (including nature/type of the project)  
.....
- 1.2. Location (including survey No./Plot No and project area, if applicable).....
- 1.3. Environmental Focal Person & Contact details.....
- 1.4. Number of employees (regular/casual, national and non-national):.....
- 1.5. Year of Commencement.....
- 1.6. EC reference No. and its validity.....
- 1.7. Date of reporting.....

## 2. Description of the compliance to EC terms and conditions

<b>Sl No</b>	<b>Terms and Condition of the EC</b>	<b>Action/activities undertaken/implemented to achieve compliance including evidence, wherever applicable</b>	<b>Remarks</b>
		.	

3. Any other initiatives undertaken other than stipulated in the EC

.....

.....

.....

.....

4. Emission/discharge test, if applicable

Sl No	Parameters as in Environmental Standards, 2010					Emission test result carried out by the project proponent (Attach the test report)					Date and time of monitoring. Specify methodology of test	Remarks
	Industrial effluent discharge	Ambient air quality	Industrial emissions	Work place emission	Noise level	Industrial effluent discharge	Ambient air quality	Industrial emissions	Work place emission	Noise level		
1												
2												
3												
4												
5												

5. Details of attachment (Documents that needs to be attached while providing information as required under point number 2, 3 and 4).....

.....

.....

.....

Reported by:

(Signature)

Name:

Designation:



Company:

**(c) Detailed Implementation Plan Format**

Detailed Implementation Plan				
SI No	Specify terms and conditions of the EC	Activities/actions that will be undertaken to implement the terms and conditions	Time frame required	Responsibility



**Annex – 4: Effluent Water Analysis, Raw Sewage water, WWTP- Thimphu Thromde**  
**(i) Sample Collection time- 9.00 a.m.**

 <b>ENVIROCHECK</b>		<b>Environmental Laboratory</b> 189 & 190, Rastraguru Avenue, Kolkata-700 028 Phone : 2579-2889/2891, 2549-7490 Fax : 2529-9141 E-mail : envcheck@cal2.vsnl.net.in																																														
<b>EFFLUENT WATER ANALYSIS REPORT</b>																																																
1.	Name of the Industry	: Technofab Engineering Ltd.																																														
2.	Address	: Plot No.05, Sector 27-C, Faridabad – 121003																																														
3.	Report No.	: Env/554/W/M(i)/16-17																																														
4.	Date of sampling	: 28.01.2017																																														
5.	Reporting date	: 08.02.2017																																														
6.	Type of sample	: Domestic Effluent Water																																														
7.	Collection & preservation of sample	: APHA 22 <sup>nd</sup> Edition, 1060																																														
8.	Location of sample	: Raw Sewage water from Project Site Inlet (09:00 a.m.) [Raw Water Sewage Collection from WWTP Site at Babesa Thimpu – Bhutan]																																														
<table border="1"> <thead> <tr> <th>PARAMETERS</th> <th>RESULTS</th> </tr> </thead> <tbody> <tr> <td>1. *Size Distribution of Particulate in Raw Sewage</td> <td>: **</td> </tr> <tr> <td>2. Temperature (°C)</td> <td>: 10.0</td> </tr> <tr> <td>3. pH</td> <td>: 6.72</td> </tr> <tr> <td>4. Total Suspended Solids (mg./l)</td> <td>: 256.0</td> </tr> <tr> <td>5. Total Solids (mg./l)</td> <td>: 410.0</td> </tr> <tr> <td>6. VSS/TSS</td> <td>: 0.71</td> </tr> <tr> <td>7. Total Alkalinity (mg./l)</td> <td>: 264.0</td> </tr> <tr> <td>8. Chloride (mg./l)</td> <td>: 40.20</td> </tr> <tr> <td>9. Residual Free Chlorine (mg./l)</td> <td>: &lt;0.04</td> </tr> <tr> <td>10. Oil &amp; Grease (mg./l)</td> <td>: 3.50</td> </tr> <tr> <td>11. Total Khjeldhal Nitrogen (mg./l)</td> <td>: 25.0</td> </tr> <tr> <td>12. Ammonical Nitrogen (mg./l)</td> <td>: 6.50</td> </tr> <tr> <td>13. Total Phosphate (mg./l)</td> <td>: 18.50</td> </tr> <tr> <td>14. Dissolved Oxygen (mg./l)</td> <td>: 1.20</td> </tr> <tr> <td>15. COD (mg./l)</td> <td>: 496.92</td> </tr> <tr> <td>16. BOD [5 Day's at 20 °C] (mg./l)</td> <td>: 210.0</td> </tr> <tr> <td>17. Total Chromium (mg./l)</td> <td>: &lt;0.06</td> </tr> <tr> <td>18. Total Coliform (CFU/100 ml.)</td> <td>: 7.2 x 10<sup>4</sup></td> </tr> <tr> <td>19. Faecal Coliform (CFU/100 ml.)</td> <td>: 5.84 x 10<sup>4</sup></td> </tr> <tr> <td>20. Specific Gravity of Grit</td> <td>: 2.90</td> </tr> <tr> <td>21. Quantity of Grit in Raw Sewage (mg./100 ml.)</td> <td>: 1.5</td> </tr> <tr> <td>22. Oxygen Absorption (KMnO<sub>4</sub>) (mg./l)</td> <td>: 45.0</td> </tr> </tbody> </table>			PARAMETERS	RESULTS	1. *Size Distribution of Particulate in Raw Sewage	: **	2. Temperature (°C)	: 10.0	3. pH	: 6.72	4. Total Suspended Solids (mg./l)	: 256.0	5. Total Solids (mg./l)	: 410.0	6. VSS/TSS	: 0.71	7. Total Alkalinity (mg./l)	: 264.0	8. Chloride (mg./l)	: 40.20	9. Residual Free Chlorine (mg./l)	: <0.04	10. Oil & Grease (mg./l)	: 3.50	11. Total Khjeldhal Nitrogen (mg./l)	: 25.0	12. Ammonical Nitrogen (mg./l)	: 6.50	13. Total Phosphate (mg./l)	: 18.50	14. Dissolved Oxygen (mg./l)	: 1.20	15. COD (mg./l)	: 496.92	16. BOD [5 Day's at 20 °C] (mg./l)	: 210.0	17. Total Chromium (mg./l)	: <0.06	18. Total Coliform (CFU/100 ml.)	: 7.2 x 10 <sup>4</sup>	19. Faecal Coliform (CFU/100 ml.)	: 5.84 x 10 <sup>4</sup>	20. Specific Gravity of Grit	: 2.90	21. Quantity of Grit in Raw Sewage (mg./100 ml.)	: 1.5	22. Oxygen Absorption (KMnO <sub>4</sub> ) (mg./l)	: 45.0
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<small>*Sand (%) – 40.0, Silt – 30%, Clay – 30%          Sand = 0.05 mm – 2.0 mm, Silt = 0.05 mm – 0.002 mm and Clay = &lt;0.002 mm</small>																																																
<b>Authorised Signatory :</b>  <b>Dr. Ajoy Paul</b> <b>(Scientist)</b>																																																

(ii) Sample Collection time- 2.00 p.m.

**ENVIROCHECK**

Environmental Laboratory  
189 & 190, Rastraguru Avenue, Kolkata-700 028  
Phone : 2579-2889/2891, 2549-7490  
Fax : 2529-9141  
E-mail : envirocheck@cal2.vsnl.net.in


**EFFLUENT WATER ANALYSIS REPORT**

1.	Name of the Industry	: Technofab Engineering Ltd.
2.	Address	: Plot No.05, Sector 27-C, Faridabad - 121003
3.	Report No.	: Env/554/W/M(ii)/16-17
4.	Date of sampling	: 28.01.2017
5.	Reporting date	: 08.02.2017
6.	Type of sample	: Domestic Effluent Water
7.	Collection & preservation of sample	: APHA 22 <sup>nd</sup> Edition, 1060
8.	Location of sample	: Raw Sewage water from Project Site Inlet (02:00 p.m.) [Raw Water Sewage Collection from WWTP Site at Babesa Thimpu - Bhutan]

PARAMETERS		RESULTS
1.	*Size Distribution of Particulate in Raw Sewage	**
2.	Temperature (°C)	12.0
3.	pH	6.80
4.	Total Suspended Solids (mg./l)	182.86
5.	Total Solids (mg./l)	380.0
6.	VSS/TSS	0.80
7.	Total Alkalinity (mg./l)	196.0
8.	Chloride (mg./l)	57.42
9.	Residual Free Chlorine (mg./l)	<0.04
10.	Oil & Grease (mg./l)	2.0
11.	Total Kjeldhal Nitrogen (mg./l)	21.50
12.	Ammonical Nitrogen (mg./l)	5.0
13.	Total Phosphate (mg./l)	15.0
14.	Dissolved Oxygen (mg./l)	1.60
15.	COD (mg./l)	486.16
16.	BOD [5 Day's at 20 °C] (mg./l)	215.0
17.	Total Chromium (mg./l)	<0.06
18.	Total Coliform (CFU/100 ml.)	9.0 x 10 <sup>4</sup>
19.	Faecal Coliform (CFU/100 ml.)	8.4 x 10 <sup>4</sup>
20.	Specific Gravity of Grit	2.80
21.	Quantity of Grit in Raw Sewage (mg./100 ml.)	1.2
22.	Oxygen Absorption (KMnO <sub>4</sub> ) (mg./l)	35.0

\*Sand - 45%, Silt - 35%, Clay - 20%  
Sand = 0.05 mm - 2.0 mm, Silt = 0.05 mm - 0.002 mm and Clay = <0.002 mm

Authorised Signatory :

  
Dr. Ajoy Paul  
(Scientist)



(iii) Sample Collection time- 4.00 p.m.

**ENVIROCHECK**

Environmental Laboratory  
189 & 190, Rastraguru Avenue, Kolkata-700 028  
Phone : 2579-2889/2891, 2549-7490  
Fax : 2529-9141  
E-mail : envirocheck@cal2.vsnl.net.in


**EFFLUENT WATER ANALYSIS REPORT**

1.	Name of the Industry	:	Technofab Engineering Ltd.
2.	Address	:	Plot No.05, Sector 27-C, Faridabad - 121003
3.	Report No.	:	Env/554/W/M(iii)/16-17
4.	Date of sampling	:	28.01.2017
5.	Reporting date	:	08.02.2017
6.	Type of sample	:	Domestic Effluent Water
7.	Collection & preservation of sample	:	APHA 22 <sup>nd</sup> Edition, 1060
8.	Location of sample	:	Raw Sewage water from Project Site Inlet (04:00 p.m.) [Raw Water Sewage Collection from WWTP Site at Babesa Thimpu - Bhutan]

PARAMETERS		RESULTS
1.	*Size Distribution of Particulate in Raw Sewage	**
2.	Temperature (°C)	13.0
3.	pH	6.85
4.	Total Suspended Solids (mg./l)	166.67
5.	Total Solids (mg./l)	350.0
6.	VSS/TSS	0.76
7.	Total Alkalinity (mg./l)	176.0
8.	Chloride (mg./l)	47.85
9.	Residual Free Chlorine (mg./l)	<0.04
10.	Oil & Grease (mg./l)	2.50
11.	Total Kjeldhal Nitrogen (mg./l)	18.50
12.	Ammonical Nitrogen (mg./l)	3.80
13.	Total Phosphate (mg./l)	12.50
14.	Dissolved Oxygen (mg./l)	1.80
15.	COD (mg./l)	430.52
16.	BOD [5 Day's at 20 °C] (mg./l)	180.0
17.	Total Chromium (mg./l)	<0.06
18.	Total Coliform (CFU/100 ml.)	1.248 x 10 <sup>5</sup>
19.	Faecal Coliform (CFU/100 ml.)	1.168 x 10 <sup>5</sup>
20.	Specific Gravity of Grit	2.70
21.	Quantity of Grit in Raw Sewage (mg./100 ml.)	1.0
22.	Oxygen Absorption (KMnO <sub>4</sub> ) (mg./l)	35.0

\*Sand - 42%, Silt - 28%, Clay - 30%  
Sand = 0.05 mm - 2.0 mm, Silt = 0.05 mm - 0.002 mm and Clay = <0.002 mm

Authorised Signatory :

  
Dr. Ajoy Paul  
(Scientist)

**Annex – 5: Environmental Management Plan, WWTP –Thimphu Thromde**

**ENVIRONMENT MANAGEMENT PLAN**  
**FOR THE EXECUTION OF THE PROJECT**

DOCUMENT NO :0-3600-EMP-01

PROJECT : Design, Build, Operate & Transfer 1 12 MLD Wastewater Treatment Plant at Thimphu, Bhutan

CONTRACT NO. : TCC/WWTP/GM/001

**INDEX**

CHAPTER	CONTENTS	PAGE NOS.	
		FROM	TO
I	INTRODUCTION	2	2
II	SCOPE & OBJECTIVE	3	4
III	PLANNING (Environmental Risk Identification & Evaluation)	4	6
IV	IMPLEMENTATION	7	10
V	EMERGENCY PREPAREDNESS & RESPONSE PROCEDURE TOWARDS ENVIRONMENTAL EMERGENCY	11	14
VI	MONITORING	15	15
VII	AUDITING	15	15
VIII	REVIEW OF ESMP	16	16

**CHAPTER – I**

**INTRODUCTION**

The Project titled as “Design, Build, Operate & Transfer a 12 MLD Wastewater Treatment Plant at Thimphu, Bhutan – TCC/WWTP/GM/001”

Environment Management Plan (EMP) of M/s TECHNOFAB ENGINEERING LIMITED is designed for this PROJECT. This document serves to identify and describe the principles, responsibilities and activities that TECHNOFAB ENGINEERING LIMITED is committed to implement to manage more effectively the environmental aspects and impacts during the different phase of the project.

**CHAPTER – II**

**SCOPE & OBJECTIVE**

**SCOPE**

This document outlines in detail the systematic and planned commitment of M/s. TECHNOFAB ENGINEERING LIMITED management and their team associated Project site, for effective implementation of Environment Management Plan so as to meet statutory and regulatory environmental requirements in Thimphu, Bhutan.

## OBJECTIVE

Environment Management Plan (EMP) of M/s TECHNOFAB ENGINEERING LIMITED is designed for Design, Build, Operate & Transfer a 12 MLD Wastewater Treatment Plant at Thimphu, Bhutan. The objective of this EMP is to:

- Identify potential environmental impacts to be encountered during the execution of project and take necessary measures and precautions to ensure that the site operations are in conformity with statutory and regulatory environmental requirements of Bhutan.
- To take measures to avoid any nuisance or disturbance arising from the execution of works.
- Maintaining camp and work places in a clean and tidy condition.
- Dust and pollution control of site
- Measures to avoid contaminations to drinking water production and distribution
- Organization of monitoring system for self-control of the emissions
- Solid and liquid waste management
- Action plan during emergency incidents.
- Restore the working area or adjacent areas affected during operations to its original state.
- Create a mechanism for feedback and inputs by any affected party and its appropriate resolution

The Management of TECHNOFAB ENGINEERING LIMITED is committed to follow the industry best practices and to continuously improve its environmental management and performance. The TECHNOFAB ENGINEERING LIMITED Management is also committed to make sure that all the associates / sub contractors follow the same objective.

## CHAPTER – III

### PLANNING

#### (Environmental Risk Identification & Evaluation)

The key objectives of planning are

- Ensure environmental Risks are identified
- Ensure the Mitigation Plan are in Place

Impact Identification	Mitigation Measures	Responsible for Implementation
Increasing levels of soil erosion	<ul style="list-style-type: none"> <li>- Stripping: a layer of topsoil at least 20cm thick, should be handled in order to replace it at the closure of opened trenches to bury the water transmission main;</li> <li>- Vegetation with properties to prevent erosion (creepers and herbaceous</li> </ul>	ESO

	<p>layer) should be kept and in special cases must be replanted;</p> <ul style="list-style-type: none"> <li>- Take appropriate measures to ensure that the erosion is controlled through slopes stabilization , use of vegetation, sedimentation basin and other measures to ensure the dissipation of concentrated surface flow;</li> <li>- Replacement of vegetation with shrubs of slow growth rate may therefore help in retaining water thus reduce erosion;</li> <li>- Restrict movement of heavy vehicles in area prone to erosion</li> </ul>	
Degradation of soil and water resulting from construction activities	<ul style="list-style-type: none"> <li>- The cement, fuels and oils should be discharged in a temporary construction camp(for the construction phase) which should be compacted and sealed, leaving the building materials stored in pallets at elevated surface</li> <li>- The repair or maintenance of equipment , especially those related to hydrocarbons (oil &amp; fuel) should occur in licensed shops; if deemed necessary to repair some equipment on the work front, the operation will only occur in area authorized by ESO and these must be adequately prepared to retain the oil spills</li> <li>- All temporary buildings of the yard should be mounted or constructed on a cement platform, which will be removed for recycling, during the closing phase of the construction sites.</li> <li>- Post construction work , the yard should be disabled and the area should be rehabilitated;</li> </ul>	ESO
Potential erosion and inundation	<ul style="list-style-type: none"> <li>- Reduce the exposure time of material susceptible to be dragged in rainfall event;</li> <li>- Immediate replacement of the soils removed in the opening trenches.</li> </ul>	ESO
Impact Identification	Mitigation Measures	Responsible for Implementation
Potential soil and ground water pollution by accidental discharge or misuse of hydrocarbons	<ul style="list-style-type: none"> <li>- Pollutant materials such as fuels, lubricants, detergents , cement and others must be handled properly to avoid spills;</li> <li>- Fuelling of machinery and vehicles should be done in appropriate locations previously identified within the site;</li> <li>- The fuel storage and maintenance or refueling of vehicles or equipment should be made at a distance not less than 100m from any water course or</li> </ul>	ESO

	<p>wetlands, where there is potential for spills of fuel and contamination of watercourses or underground water;</p> <ul style="list-style-type: none"> <li>- The used lubricating oils must be collected in drums, sealed, sold / donated to companies that recycle them and their transport should obey the instructions given;</li> <li>- Avoid as much as possible oil or fuel spillage on the ground;</li> <li>- The maintenance of vehicle should be in workshop within the site;</li> <li>- If removal of vehicles to the workshop cannot not be possible, maintenance can be done in another place only with the necessary precautions such as covering the ground with impermeable material such as plastic sheets with a barrier for effluent containment;</li> <li>- Construction sites, temporary warehouses and yards should be cleaned to prevent indiscriminate fires, burial or abandonment of waste;</li> <li>- A team should be responsible for maintaining the work area clean, collecting all waste produced by the workers involved in the project, and deposit them in appropriate places;</li> <li>- Drums that have been used with toxic chemicals such as fuels and lubricants should be returned to the distributors of these products; those that have not been used with toxic products can be distributed to the people for use as water reservoir.</li> </ul>	
Impacts on health as a result of deteriorating air quality due to emission of dust and particulate matter	<ul style="list-style-type: none"> <li>- All workers in the service area should wear protective dust masks;</li> <li>- Limit removal of vegetation to the minimum necessary to reduce the exposed areas;</li> <li>- Restricting the duration of the removal of soil layers during the opening of trenches and proceed immediately to their protection with vegetation cover after the replacement, protecting them from the wind until the vegetation grows;</li> <li>- Limiting the speed of movement of machinery and vehicles to 20km/h within the unpaved road;</li> <li>- Transport of materials should be done within the limits of load of equipment, and cargo should be covered;</li> <li>- The method of spraying water in the soil of the roads and unpaved roads to lay the dust should be done whenever</li> </ul>	

	<p>necessary (e.g. before the start of activities that generate high levels of dust, under conditions of high winds);</p> <ul style="list-style-type: none"> <li>- Additionally protection measures and monitoring of communities nearby should be adopted : <ul style="list-style-type: none"> <li>• sound and wind barriers should be provided in the vicinity of the communities near the project site;</li> <li>• a dust monitoring system should be established near the communities, if necessary, to determine further mitigation measures together.</li> </ul> </li> </ul>	
Changes in air quality due to increased emission of fumes and gases by vehicles and machinery allocated to the project	<ul style="list-style-type: none"> <li>- The selected contractor must have equipment in good condition to reduce emissions to levels within stipulated limits.</li> </ul>	ESO

## **CHAPTER – IV**

### **IMPLEMENTATION**

#### **Responsibilities of Environmental Site Officer (ESO)**

- Ensure implementation of the legal environmental requirements set out in the EMP
- Monitor the implementation of the EMP and report and investigate all environmental incidents at the workplace
- Advise about the activities to be taken to minimize conflicts with local communities
- Sensitize workers about the need for compliance with environmental requirements and ensure that the Project Managers are regularly reminded of their responsibilities under the EMP
- Communicate environmental issues to staff managers / engineers / supervisors ensuring they are kept updated about their responsibilities under the EMP
- Promote an introductory training on environmental issues for all workers and make them aware regarding health and safety on site throughout the construction phase
- Maintain liaison with the teams, Employer's Representative and other stakeholders and ensuring that they are kept informed about aspects of environmental management related to the project
- Ensure the non – compliances with environmental requirements are reported to the project manager.

- Recommend corrective measures to environmental issues internally identified or as a result of environmental audits/enforcement activities; if necessary, should seek support from National Environmental Commission or environmental professionals about the corrective measures to be implemented.
- Conducting and Participating in Regular Internal Audits to assess the level of compliances and setting up targets for going forward.

#### **Responsibilities of HEALTH AND SAFETY SITE OFFICER (HSO)**

- Ensure implementations of the health and safety requirements set out in the EMP;
- Ensure the implementation of the strategy for prevention and combat against HIV and AIDS for the intervention areas of planned infrastructure
- Monitor the EMP implementation and the strategy of prevention and combat against HIV and AIDS report , investigate and correct any violations of these documents;
- Implement introductory (induction) courses on environmental issues for all employees and visitors to the project and make them aware regarding health and safety legislation.
- Ensure that all employees are familiar with the requirements and activities to develop the work safely. For that, dialogues on occupational health and safety should be carried out before the start of the daily work of all employees;
- Communicate issues of occupational health and safety to staff members , ensuing they are kept updated on their responsibilities;
- Maintain liaison with other concerned supervisors, officers and representatives of client.;
- Ensure that non compliances with health and safety requirements are reported to the PROJECT MANAGER;
- Create an emergency response team and a first aid team;
- Ensure the existence of equipment to prevent and respond to emergencies at workplace , including the devices for suppressing and extinguishing fire and means of evacuation ;
- Establish procedures for internal and external communications, providing information on the emergency and activities taken. It is based on this information that LAHMEYER will inform the media and /or other interested parties and / or affected.
- Call all means to respond to emergencies, including the mobilization or request of mobilization of cars, helicopter or other evacuation resources. The priority is to save human lives:
- Making decisions about the need for partial or total evacuation, it is imperative that in an emergency, inspection is conducted and check the number of people as quickly as possible.

#### **Responsibilities of ENGINEERS/ FOREMEN**

- Ensuring environmental safety measures are well understood and followed during execution of the project.

- Ensuring adequate amount of Signage / Display Board indicating various DO'S and DON'T's.
- Checking and confirming that all facilities, tools and tackles, equipment and machineries are all in safe & efficient working condition. Mainly ensuring that there is no oil leakages/spillages, loosening of nuts & bolts, frayed electrical insulation for equipments and abnormal vibration / noises from the equipments in use.
- To prepare activity schedules, planning, manpower planning and progress monitoring/ reporting.
- To participate in Training programs conducted by Site Environment and Safety Officer also to encourage the compliances of pre scheduled activities
- Making sure that the Health, Safety and Environmental Records are being maintained and updated by the concerned HSO & ESO while keeping track with Environment and Safety measures undertaken/ implemented.
- To ensure that the personnel working under their supervision are competent enough to understand and communicate down the line regarding the relevant environmental and safety procedures.
- Reporting all accidents/ incidents / near misses to the management to enable to take the realistic view of ongoing environmental, health and safety performances of the SITE.

#### **General Workers Responsibilities:**

Environment Awareness shall be provided to all staff so as to have regard for the social and ecological well-being of the site and adjacent areas. Staff shall be educated to maintain the following rules:

- No alcohol/drugs consumption on site;
- Prevent unsocial / aggressive behavior
- No bringing of pets onto site
- No harvesting of firewood from the site and adjacent areas
- Avoiding use of surrounding bush as a toilet facility
- Trespassing on private/commercial properties adjoining the site shall be forbidden
- Driving under the influence of alcohol shall be prohibited
- Littering and disposal of waste onsite as well as adjacent areas shall be prohibited

TECHNOBAB ENGINEERING LIMITED will ensure that all the workers (including the sub contractors) will have a system in place to enable them to take part in the continuous improvement of environmental management performances.

#### **Training**

All field staff will be given EMP orientation and in – house induction;

The performance of the field staff at all level deployed for different activities of work shall be reviewed by the In – Charge and the individual would be recommended for further training if found necessary..



TECHNOFAB ENGINEERING LIMITED Management and its sub- contractors will comply the following while executing the job.

- Environmental Legislations of ROYAL GOVERNMENT OF BHUTAN
- Govt. Regulations , codes and standards as applicable

## **CHAPTER – V**

### **EMERGENCY PREPAREDNESS AND RESPONSE PROCEDURE TOWARDS ENVIRONMENTAL EMERGENCY**

#### **Emergency Preparedness**

**POLICY STATEMENT** towards Preparedness

**TECHNOFAB ENGINEERING LIMITED** is committed to protecting the community, personal property, and the environment in the event emergency situations arise from the Construction Project .These situations will be handled through the implementation of an Emergency Response Plan (ERP) in adherence to all applicable response law and regulations.

Based on relevant experiences and best professional judgment, TE believes that the following types of hazards have the potential to occur at the Project Site:

- Spills ( in water or Soil) of Hazardous Materials , including
  - Diesel
  - Hydraulic Oil
  - Lubricating Oil and Grease
  - Cleaning Solvents
  - Paint and Paint Thinner
  - Concrete from release agents
- Fire

**Here is the Site Emergency Team below.**

#### **THE MAIN SITE EMERGENCY TEAM**

<b>EMERGENCY POSITION</b>	<b>NAME &amp; WORK UNIT</b>	<b>CONTACT NUMBER</b>
CONSTRUCTION MANAGER(AGM)	ATUL GAUR	+975-77200985
PROJECT ENGINEER	TASHI TOPGYAL	+975-16161616

#### **EMERGENCY CONTACTS**

Local Emergency Medical Services, Police Services, Fire Services

#### **- EMERGENCY PHONE NUMBERS**

Description	Contact Number	Remarks
Hospital Ambulance Service	112	
Fire Department	110	
Police	113	
Spill Emergency Response Procedure		
Scenario: a piece of heavy equipment parked on the side of the road has leaked oil into a nearby ditch. Arriving on the scene workers see the oil heading towards a nearby stream.		

How to setup for a test: explain the scene to the participants and let them give feedback on what response steps should be taken to avoid further contamination. Use a pail of water and popcorn-create the spill and let the workers respond accordingly.

<u>ACTION &amp; SEQUENCES</u>		
1	Recognize the problem, & evaluate	<ul style="list-style-type: none"> <li>Identify type of material spilled &amp; volume.</li> <li>Identify &amp; evaluate potential problems that may be encountered in control, containment &amp; cleanup.</li> <li>Refer to the MSDS for the material spilled.</li> <li>Have fire extinguishers available if there is a risk of fire.</li> </ul>
2.	Take Control	<ul style="list-style-type: none"> <li>Stop Operation &amp; shut off equipment</li> <li>If safe, remove any sources of spark or flame</li> <li>Ensure supervisor &amp; fellow workers are notified</li> <li>Stop the sources of the spill where possible</li> </ul>
3.	Contain the spill	<ul style="list-style-type: none"> <li>Blocking flow (use spill pads, buckets, booms, absorbents, snow or soil to make a berm)</li> <li>Use resources at hand to minimize spread and impact of the spill until additional resources &amp; expertise arrive</li> <li>Use available equipment to create a barrier or berm.</li> </ul>
4.	Commence recovery of the spilled material	<ul style="list-style-type: none"> <li>Soak up all free product with available materials</li> <li>Mix stained soil with loose absorbents or commercial bioremediation agents</li> <li>&lt;25 liters – low risk : Mop up excess fluids with spill pads/ booms and place in container/plastic bag for disposal</li> <li>&gt;25 liters – high risk: Do initial mop up with available materials. Contact ESO for further instructions</li> </ul>
5.	Report the Spill to appropriate personnel	<ul style="list-style-type: none"> <li>Low risk spill (&lt;25L &amp; not in water) : report to your immediate supervisor</li> <li>High risk spill (&gt;25L or in water) : report to supervisor &amp; ESO</li> </ul>
6.	Complete an Incident Report	<ul style="list-style-type: none"> <li>For the purpose of the exercise review required incident reporting requirements only and copy to your files.</li> </ul>

<u>Fire Emergency Response Procedure</u>		
<p>Scenario : a worker discovers a small fire (lightning strike) at the edge of cut block that has almost spread into the standing timber.</p> <p>How to setup for a test: explain the scene to the participants and let them give feedback on what response steps should be taken to combat this fire. Mark the area that is on “fire” with highly visible flagging tape. Instruct the participants as to the nature of the fire and allow them to respond.</p>		
<u>ACTION &amp; SEQUENCES</u>		
1.	STOP operation	<ul style="list-style-type: none"> <li>Notify supervisor &amp; all personnel in the immediate area</li> </ul>
2.	Report the fire to appropriate authorities	<ul style="list-style-type: none"> <li>Immediate Supervisor / ESO</li> </ul>
3.	Assess the hazard and the safety risk,	<ul style="list-style-type: none"> <li>Consider; fire size, behavior, crew experience, training, available equipment, and personnel required.</li> </ul>
4.	Develop a plan for initial attack	<ul style="list-style-type: none"> <li>The supervisor/ESO should determine the method of initial response, equipment, and personnel required</li> </ul>
5.	Provide direction/instruction to the fire fighting crew	<ul style="list-style-type: none"> <li>Response level based on: fire size, behavior, crew experience, training and available equipment</li> </ul>

		<ul style="list-style-type: none"> <li>The supervisor holder will monitor the firefighting efforts until relieved by a higher authority or another trained suppression worker.</li> </ul>
6.	Complete initial response on the fire	<ul style="list-style-type: none"> <li>Response level based on: fire size, behavior, crew experience, training and available equipment</li> <li>The supervisor holder will monitor the firefighting efforts until relieved by a higher authority or another trained suppression worker.</li> </ul>
7.	Complete mop up with appropriate personnel	<ul style="list-style-type: none"> <li>Mop up will be performed under the direction of a qualified supervisor / ESO.</li> </ul>
8.	Complete an Incident Report	<ul style="list-style-type: none"> <li>For the purposes of the exercise review required incident reporting equipments only</li> </ul>

Landslide / Erosion Emergency Response Procedure		
ACTION & SEQUENCES		
1.	Assess the hazard and the safety risk	<ul style="list-style-type: none"> <li>Evaluate the size and impact of the erosion event</li> <li>Warn others in the immediate area of any safety hazards and secure the zone from further entry if possible</li> </ul>
2.	Develop a plan of evacuation	<p>If required the supervisor will devise a plan to evacuate the crew in a safe manner</p> <ul style="list-style-type: none"> <li>If required; workers to be mustered into a safe zone while awaiting evacuation</li> </ul>
3.	Report the event to appropriate authorities	<ul style="list-style-type: none"> <li>Notify your immediate supervisor</li> <li>Notify your BCTS representative for further instruction</li> </ul>
4.	Take remedial action	<ul style="list-style-type: none"> <li>Take steps to control further environmental impacts</li> <li>Use heavy equipment to remove the slide or to make an emergency access</li> </ul>
5.	Complete an Incident Report	<ul style="list-style-type: none"> <li>For the purposes of the exercise review required incident reporting requirements only and copy to your files and BCTS rep.</li> </ul>

## **CHAPTER – VI**

### **MONITORING**

The Key objectives of monitoring are

- Ensure the ESMP is implemented
- Evaluate the effectiveness of the mitigation measures
- Verification of the predicted impacts
- Providing the feedback to the concerned

ESO would organize weekly meeting to review / monitor compliance status

## **CHAPTER – VII**

### **AUDITING**

Planned and documented audit to verify the implementation and effectiveness of ESMP in all works shall be carried through the process internal auditing of the Company.

Auditing shall be done as frequently as needed based on the following

- To verify proper document of records
- To verify implementation of required corrective and preventive actions

- While significant changes are made such as revision /up gradation of procedures are made

Post audit activities such as holding meetings with audit team, issue of reports etc shall be carried out. Copy of audit reports with respect to initiation and completion of corrective actions shall be prepared and made available at site for reference.

## **CHAPTER – VIII**





### **REVIEW OF ESMP**





#### **ESMP Review**



- The Review Period has been kept as once in a year unless there is a specific demand from the Client / Inspection Team or as per the report from any Auditing.

## b) Photographs

## Annex 6: Photographs from Field Visits for Components 1, 2, &amp; 3.

Sl. No	Name of work/activities	Present status	Picture reference	Remarks
<b>Component 1: Thimphu Thromde_ Construction of Waste Water Treatment Plant.</b>				
1	Erection of signage.	Completed.		Sign board erected. (Overall project information.)
2	Office / Administrative building.	Completed		Office building already being used by PIU and contractor's offices.
3	Staff Building	Completed		Staff building already occupied by staff.
4	Sewer Line	Completed		Sewer line connecting to WWTP.

5	Sewer Line	Completed		Sewer lines besides the existing sewer ponds connecting to WWTP.
6	Electrical cable lines.	Completed		Electrical cables laid in ducts.
7	Footpath and road	Completed		Footpath, road and fencing constructed.
8	Labour work permits.	Issued.		Labour permits issued by Dept. of Immigration. All permits pertain to COVID-19.

9	Labour work permits.	Issued.		Sample of COVID-19 work permit issued to laborers by the Department of Immigration.
10	WWTP project	98% complete		Bird's eye-view of location from right bank of Thimphu chu.


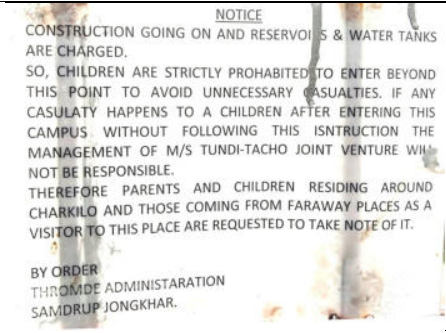


**Component 2: Phuentsholing Thromde – Construction of 46.8m Bridge over Omchu river.**

11	Erection of sign boards.	Completed.		Sign board erected. (Overall project information.)
12	Bridge	Completed		View of the bridge from left bank (upper side).














13	Bridge	Completed		View of the bridge from left bank (lower side).
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**Component 3: Samdrup Jongkhar Thromde\_ Water Supply from Rikke chu**

14	Erection of sign boards.	Completed.		Sign board erected. (Overall project information.)
15	Erection of sign boards.	Completed.		Notice put up at the entrance of the WTP gate for compliance.
16	WTP Complex	Complete		View of the WTP complex from Samdrup Jongkhar-Trashigang Highway.
17	WTP Complex	Complete		View of the WTP complex from Samdrup Jongkhar-Trashigang Highway. (From another angle.)



18	WTP Complex	Complete		Part of the WTP complex.
19	Office building.	Completed.		Completed office building with entry gate, fencing and fire-fighting equipment.
20	WTP Complex	Completed.		Entrance to WTP complex with gate, guard room (right) and office building (left).
21	WTP Complex	Completed.		Guard room with notice board at the entrance.
22	WTP Complex	Completed.		Diesel generator shed, power supply Transformer and guard room(left to right).
23	WTP Complex	Completed.		Sludge Drying Yard

24	WTP Complex	Completed.		Chemical building, collection chamber, sludge thickener and office building (left to right).
25	WTP Complex	Completed. (View from Centrifuge Building.)		
26	Construction of Approach Road and Improvement works at Intake.	Completed.		Completed and site handed over to Thromde on the 13 <sup>th</sup> November 2019. (Take-off from highway on the left.)
27	Construction of Approach Road and Improvement works at Intake.	Completed.		Entry gate at the Approach road to Intake site.
28	Construction of Approach Road and Improvement works at Intake.	Completed.		View of the Intake site.

Construction of Approach Road and Improvement works at Intake.	Completed.		Fish ladder on the left side. (Intake site.)
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### c) Appendix C\_ Environmental Criteria and Standards

#### I. Ambient Air Quality Standards (Maximum Permissible Limits in $\mu\text{g}/\text{m}^3$ )

*Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010*

Parameter	Industrial Area	Mixed Area*	Sensitive Area**
<b>Total Suspended Particulate matter</b>			
24 Hour Average	500	200	100
Yearly Average	360	140	70
<b>Respiratable Particulate matter (PM10)</b>			
24 Hour Average	200	100	75
Yearly Average	120	60	50
<b>Sulfur Dioxide</b>			
24 Hour Average	120	80	30
Yearly Average	80	60	15
<b>Nitrogen Oxides</b>			
24 Hour Average	120	80	30
Yearly Average	80	60	15
<b>Carbon Monoxide</b>			
8 Hour Average	5,000	2,000	1,000
1 Hour Average	10,000	4,000	2,000

\* **Mixed Area** means where residential, commercial or both activities take place

\*\***Sensitive Area** means where sensitive targets are in place like hospitals, Schools, sensitive ecosystems.

**Source:** Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

#### II. Noise Level Limits:

Industrial Area		Mixed Area		Sensitive Area	
Day *	Night **	Day	Night	Day	Night
75 dB (A)	65 dB (A)	65 dB (A)	55 dB (A)	55 dB (A)	45 dB (A)

**Note:** All the values are maximum values

\*Day time is from 0600 hours to 2200 hours (human activities) \*\*Night time is from 2200 hours to 0600 hours (no human activities)

**Source:** Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

#### III. Vehicle Emission Standards:

Fuel Type	Vehicle registered prior to 01 <sup>st</sup> Jan 2005	Vehicle registered after 01 <sup>st</sup> Jan 2005	Type Approval
Petrol (% CO)	4.5	4	Euro II
Diesel (% HSU)	75	70	

**Source:** Environmental Standards, National Environment Commission, Royal Government of Bhutan, Nov. 2010

#### IV. Ambient Water Quality Criteria for various uses (September, 2010)

Sl. No.	Parameters	A	B	C
1	pH	6.5-8.5	6 to 9	6 to 9
2	Colour, Hz Units	5	50	-
3	TSS mg/l	25	100	-
4	Conductivity, $\mu$ S/cm	800	1000	2000
5	Odour	Unobjectionable	Unobjectionable	-
6	Mineral Oil	No film	No film	-
7	Nitrate, mg/l	10	50	-
8	Flouride, mg/l	1	2	-
9	Sulphates, mg/l	25	100	-
10	Chloride, mg/l	50	200	-
11	Surfactants, mg/l	0.1	0.2	-
12	Phosphates, mg/l	0.5	<1.0	-
13	DO, mg/l	6	4	-
14	BOD, mg/l	2	5	50
15	TKN, mg/l	0.5	2	-
16	Ammonia, mg/l	0.05	0.5	-
17	T. Coliform, MPN/100 ml*	50	5000	10000
18	F. Coliform, MPN/100 ml*	20	2000	5000
19	F.streptococci, MPN/100 ml*	20	1000	1000
20	Dissolved Iron, mg/l	0.2	0.5	-
21	Copper, mg/l	0.05	0.1	-
22	Zinc, mg/l	0.2	0.5	-
23	Arsenic, mg/l	0.01	0.05	-
24	Cadmium, mg/l	0.003	0.003	-
25	Total-Chromium, mg/l	0.05	0.05	-
26	Lead, mg/l	0.02	0.02	-
27	Selenium, mg/l	0.01	0.01	-
28	Mercury, mg/l	0.0005	0.0005	-
29	Phenol, mg/l	0.001	0.002	-
30	Cyanides	0.05	0.05	-
31	PAH, mg/l	0.0002	0.0002	0.001
32	Total Pesticides, mg/l	0.0005	0.0005	0.001
33	PCB mg/l	0.0002	0.0002	-
34	SAR	-	-	-
35	Boron	-	-	1
36	Floating Materials such as wood, plastic, rubber, excreta, garbage etc.	Absent	Absent	Absent

**Source:** Environmental Standards, National Environmental Commission, Royal Government of Bhutan.

**Note:**

1. (Very good) Drinking water source without conventional treatment, but after disinfection whenever necessary.
2. (Good) Drinking water source without conventional treatment.
3. (Moderate) Use for irrigation, industrial cooling etc.
4. *To achieve the drinking quality standards, disinfection/ boiling of the water is recommended. The total coli form may be high due to their contribution from natural sources like soil, litter, etc., which does not relate to pathogen. If MPN of total coli form is noticed to be more than the limit suggested, than regular test should be carried out. The criteria would be satisfied if during a period not more than 5 % sample shows greater than prescribed limit.*

