

Semi-Annual Environmental Monitoring Report

Project number: 44240-013

Period: October 2017 – April 2018
Submission Date: 23 May 2018

BHU: Urban Infrastructure Project

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Semi-Annual Environmental Monitoring Report

Reporting Period: *April 2018*

BHU: Urban Infrastructure Project

Project Number: ADB Loan No. 2816 - BHU

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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 are completed and project got closed in 2014.. This project covered 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) modality .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 GoB 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) from SMEC, International Pty Ltd, Australia 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, Waste water	Samdrup Jongkhar (Samdrup Jongkhar and Dewathang)	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"> • To ensure that all foreseeable impacts on the environment, including cumulative effects are fully considered prior to any irrevocable commitments of resources or funds. • To ensure that all feasible alternatives are fully considered.
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"> • To ensure that all projects are implemented in line with the sustainable development policy of the Royal Government of Bhutan • To ensure that all feasible means to avoid or mitigate damage to the environment are implemented; and • To ensure that concerned people benefit from projects in terms of social facilities.
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"> • The Act provides a framework for developing measures and standards to protect Bhutan's environmental quality. Guidance relevant to this project includes: • 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. • 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.

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"> Waste management requirements of relevance to the proposed development include: 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 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
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 (FNCR) 2000	Under powers established by the FNCA, the Ministry of Agriculture promulgated the FNCR in 2000, which was revised in 2006.	Amongst other things the FNCR allows for: 1. Allotment of land and land rights in GRF; 2. Prohibitions, restrictions and concessions in GRF; 3. Transport and trade of forest produce; 4. Declaration and administration of protected areas; 5. Protection of wildlife and use of certain wild species; 6. Prevention of forest fires, land clearance, and activities potentially impacting soil, water and wildlife resources; and 7. Enforcing penalties for offences related to these and other aspects of the FNCR.
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, FNCR= Forest and Nature Conservation Rules, 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 (Policy and Planning Division (PPD) can issue the clearance to organizations like Thimphu Thromde; which is an autonomous organization.

However, the Thimphu Thromde is 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.

Table 3: 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
Component 1: Thimphu Thromde Construction of Wastewater Treatment Plant.	MoWHS or NACSQC - NEC	Environmental Information	Category B **	IEE and EMP
Component 2: Phuentsholing Thromde Construction of 46.8 m PSC Box Girder Bridge	MoWHS or NACSQC - NEC	Environmental Information	Category B **	IEE and EMP
Component 3: Samdrup Jongkhar Thromde <u>Water supply:</u> i) Intake ii) Transmission Mains iii) WTP iv) Clean Water Reservoir (CWR) v) Site office	MoWHS or NACSQC - 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
1. PMU				
Jigme Dorji	Project Manager	jdorji@mowhs.gov.bt	17643516	
2. PIUs				
a) Thimphu Thromde				
Kinley Penjore	Project Manager	kpenjore@thimphucity.gov.bt	17379020	
Thukten Tshereing	Project Engineer		17111649	
Tashi Dorjji	Project Engineer		17172677	
b) Phuentsholing Thromde				
Anu Pradhan	Project Manager	piuadbpt2012@gmail.com	17118279	
Bikash Sharma	Project Engineer	bsharma@pcc.bt	17372162	
c) S. Jongkhar Thromde				
Pema Chokey	Project Manager	pchokey@sjthromde.gov.bt	17883968	
Mani Kumar Rizal	Project Engineer	mkrizal@sjthromde.gov.bt	17661316	
3. Consultants				
K.D. Chamling	Environment Specialist	chamlingkd@gmail.com	17111541	
Rajesh Pradhan	Social Safeguard Specialist	rajpradhan2008@gmail.com	17603661	

1.5 Overall project and sub-project progress and status

Till 15th March 2018, all the three components have been awarded and works are in progress. **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 15 th March 2018
1	Component 1: Thimphu Thromde					
	Construction of Waste Water Treatment Plant.	Babesa LAP	10/Nov/2016	30	24 th Nov 2018	80%
	- Completion of drawings				End of March '18	90%
	- Construction of Office building				June 2018	80%
	- Construction of staff quarter				June 2018	80%
2	Component 2: Phuentsholing Thromde					
	Construction of 46.8 m PSC Box Girder Bridge	Over Om Chhu, near Youth Center	1/August/2017	18	20 Feb 2019	30%
3	Component 3: Samdrup Jongkhar Thromde					
	Water supply: Intake, Transmission Main & WTP, Office building	Rikkechhu and Pinchinang (Char kilo)	1/5/2016	18	30 April 2018	80%

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) ¹	If On-going Construction	
				% Physical Progress	Expected Completion Date
1. Thimphu Thromde	Construction of Waste Water Treatment Plant.	Contract awarded.	On-going construction.		
	- construction drawings			90%	End March '18
	- construction of administrative building			80%	June '18
	- construction of staff quarters			80%	June '18

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

2. P/ling Thromde	Construction of 46.8 m PSC Box Girder Bridge	Contract awarded.	On-going construction.	30%	20 Feb 2019
3. S. J/khar Thromde	Water supply:	Contract awarded.	On-going construction.	80%	30 April 2018
	- Intake – raw water equipment	Procurement awarded.	.		Delivery at site by end March '18
	- Design WTP	Submitted to PIU in Feb '18.			
	- laying of pipelines till WTP				Completed by Aug '17.
	- Construction of Office building, chlorine building and centrifuge building.			80%	30 April 2018
	- raw water pumping and transmission	Pumps to be procured and installed.			
	- Completion of drawings	28 components designs submitted except chemical building			
	- Construction of approach road to intake.	Quotation submitted to PIU.	Yet to be awarded.		

2. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS²

Table 7: Compliance Status with National Environmental Requirements

Package No.	Subproject Name	Statutory Environmental Requirements ³	Status of Compliance ⁴	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish ⁵
1. Thimphu Thromde	Construction of WWTP	Environment Clearance (EC) required.	EC obtained vide letter No. NECS/CMD/Thimphu Thromde/2568/2016/788 dated May 16, 2016.	Valid till May 15, 2019.	NA	There are 47 clauses in the EC to be complied with. Among others Clause 39 specifically requires that trees be planted within the

² 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.

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

⁴ Specify if obtained, submitted and awaiting approval, application not yet submitted

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

						WWTP to maintain greenery and improve aesthetic/visual impact of the area.
2. P/ling Thromde	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.	NA	There are nine (9) clauses with sub clauses. Under clause V. Waste Prevention and Management: 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.
3. S. J Thromde	Water Supply	EC required.	EC obtained vide NECS/ESD/Dzo-S/Jongkhar/3208/2015/2544 dated 15 May 2015.	Validity expired. (Valid up to 14 May 2017). Renewed EC yet to be obtained by Thromde.	Follow up with NECS or with MoWHS immediately on priority basis.	EC renewal has been processed by Thromde vide letter no. SJT/ESS-07/2016-2017/1429 dated 19th April 2017.

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 DUDES 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 need 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.

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			No	Monthly EMP submitted by the contractor is approved by the PM, PIU.	The PIU has not shared the final IEE with the contractors.
2. P/ling Thromde: Bridge construction.	Completed			No	Monthly EMP submitted by the contractor is approved by the PM, PIU.	The PIU has not shared the final IEE with the contractors.
3. S. J/khar Thromde: Water Supply	Completed			No	Monthly EMP submitted by the contractor is approved by the PM, PIU.	The PIU has not shared the final IEE with the contractors.

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.	Amit Kr. Sharma	Amit.gunjan1993@gmail.com	17597912
2. P/ling Thromde: Bridge construction.	Bhutan Builders Pvt. Ltd.	Hari Lal Thapa	thapahary@gmail.com	17150056 / 77706078
3. S. J/khar Thromde: Water Supply	Tundi-Tacho JV	Karma Kinley	kinseldor@gmail.com	17896785

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)⁶

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
Design Phase & Pre-Construction Phase						
1. Incorporate design measures to minimize environmental impacts	<ul style="list-style-type: none"> Detail design for project conforming to the government's environmental and technical design standards Identify potential disposal sites. 	Included in the designs.	Included in the Contract document.	Bid document.		PM, PIU
Construction Phase						
I) Orientation for Contractors, Workers on environmental management.	<ul style="list-style-type: none"> PIU to conduct awareness training/ orientation on implementation of mitigation measures in the EMP. Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents 	Training ---"---	Number of trainings conducted. ---do---	PIU/ Construction site office. --do---	Not done. 12 – 3- '18	None K.D. Chamling
II) Drainage and Hydrological Impacts including storm water management. - Wangchu River falls within the project area. Construction activities can affect/impact the river water quality due to erosion runoff.	Contractor will implement following measures to minimize the impacts. <ul style="list-style-type: none"> During construction, the contractor will ensure the proper disposal of spoil and other wastes. All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries. 	Disposed spoils.	Amount of spoils disposed.	Disposal site.	Not done.	None.

⁶ 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
III) Materials exploitation & management. <ul style="list-style-type: none"> To minimize adverse environmental impacts of borrowing and quarrying 	<ul style="list-style-type: none"> All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries. Covering of materials during transportation and spraying of water along haulage route. 	Materials brought on sight.	Transportation & material purchased challans.	Material stock yard	Not done.	PIU
IV) Waste <ul style="list-style-type: none"> Reduce spoils generation. Reduce, reuse and recycle waste to reduce contamination due to poor waste disposal practices 	<p>In principle, the waste generation will be minimized at source.</p> <ul style="list-style-type: none"> Waste products will be segregated into bio-degradable and non-biodegradable and disposed in Thimphu Thromde's waste collection system. 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 Any recyclable waste which cannot be reused during construction will be sold to licensed scrap dealers. Residual non-hazardous waste will be disposed-off in the municipal land fill. Construction/workers camps will be provided with sufficient refuse bins. Organic waste such as plant materials will be composted. Animal carcasses will be collected in a timely manner and buried; 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 	<p>No dusts emissions during transportation.</p> <p>Amount of waste generated.</p>	<p>Visual assessment.</p> <p>Record of wastes generated.</p>	<p>During transportation.</p> <p>Construction sites and camps.</p>	<p>Not done.</p> <p>Not done.</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
V) Hazardous substances • Uses and disposal waste	<p>waste will only be disposed in Thimphu Thromde's designated areas such as landfills.</p> <ul style="list-style-type: none"> 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 Oil and lubricants will be safely stored. Secondary containment around fuel storage area will be ensured. Controls and standard operating procedures will be developed for the use of fuels and other hazardous substances to prevent spills, accidents and pilferage. 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. 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. 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. Hazardous materials will be stored away from water bodies and above flood level. Clean-up operation using readily available absorbent such as sawdust will be carried 	Methods of storage	No spillage.	Store/depot.	12 March 2018	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
VI) Air quality <ul style="list-style-type: none"> To minimize and reduce fugitive dust emissions and fumes from the construction vehicles. 	<p>out immediately during accidental spillage of hazardous waste.</p> <ul style="list-style-type: none"> 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. 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. Fuel efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out. All vehicles and machinery used for construction should have valid pollution control certificates (emission tests certificates) 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. 	Dust emission.	Visual	Construction sites	12 March 2018	KD Chamling
VII) Noise <ul style="list-style-type: none"> Minimize nuisance to community due to increased noise levels 	<ul style="list-style-type: none"> 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 	Noise at site.	Harshness of sound and no complaints from public.	Construction sites.	12 March 2018	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"> Refraining from undertaking construction near schools during school hours or during examination periods, 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. 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. 				12 March 2018	KD Chamling
	<ul style="list-style-type: none"> 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. Adequate drinking water supply, basic food items, and cooking fuel (such as kerosene) will be provided to ward off competition on local resources. For maintenance of proper health and hygiene adequate number of pit latrines and garbage cans will provided. Fishing, hunting and illegal tree felling will be totally prohibited. 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 	Drinking water and electricity provided in camps.	Observation of camps	Camp sites.	12 March 2018	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
IX) Occupational Health and Safety <ul style="list-style-type: none"> Physical hazards 	<p>carry out compensatory plantation with suitable local or native plant species.</p> <ul style="list-style-type: none"> Routing of traffic to alternative roads where possible 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 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. Conducting training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees. 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. Workers should use safety strap/belts whenever and wherever required.. Fencing on all areas of excavation greater than 1m deep shall be done. Contractor will at all-time keep the first aid kit at the construction sites. Contractor will be responsible for evacuation of injured person to the nearest medical center and bear all the medical expenses 	Safety equipment.	Safety gears issued and used.	Sites	12 March 2018	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
<ul style="list-style-type: none"> Chemical hazards 	<ul style="list-style-type: none"> Reflecting signals shall be installed on all construction vehicles and plant. Reduction of engine idling time at construction sites to prevent high accumulation of toxic fumes. Use of extenders or other means to direct exhaust away from the operator. Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel or other solvents 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. 	Protective clothing	No burns to workers.	Work site.	12 March 2018	KD Chamling
<ul style="list-style-type: none"> Public Health and safety 	<ul style="list-style-type: none"> Provided safety barriers and proper signage at construction sites. Barriers must be installed to deter pedestrians' access to construction sites, except at designated crossing points. Traffic must be adequately regulated (eg through signs, signals, markings) near critical pedestrian zones or bikeways. Excavated trenches / ditches and freshly cut steep side slopes will be clearly marked and fenced for the safety of passersby and workers alike. Project or construction vehicles will be briefed on speed limit within sensitive areas such as schools, commercial and residential areas. 	Signs and barriers.	No accidents.	Construction sites.	12 March 2018	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
<ul style="list-style-type: none"> Traffic safety and management 	<ul style="list-style-type: none"> 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. Local communities to be informed about the traffic management measures that will be in place during the period of the construction. 	-	-	-	-	-
Operational Phase						
1. Noise - prevent excess noise	<ul style="list-style-type: none"> Noise barrier will be installed if needed in future 	NA	NA	NA	NA	NA
2. Gaseous Emission - prevent air pollution	<ul style="list-style-type: none"> Ensuring that vehicles undertake mandatory pollution checking and maintenance procedures. Undertake air quality monitoring 	NA	NA	NA	NA	NA
3. Particulate emissions - Control level of particulates	<ul style="list-style-type: none"> The road surface will be maintained for smooth traffic flow and reduction of vehicular emission Undertake air quality monitoring 	NA	NA	NA	NA	NA
4. Soil erosion and water pollution	<ul style="list-style-type: none"> Storm water drainage to be maintained and surrounding vegetation to be maintained in good working condition. Routine cleaning of the existing drains and water bodies. 	NA	NA	NA	NA	NA
5. Driving conditions and community safety	<ul style="list-style-type: none"> Zebra crossings to be maintained (clear & visible). Pedestrian footpath to be properly maintained. 	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
Design Phase & Pre-Construction Phase						
1. Incorporate design measures to minimize environmental impacts	<ul style="list-style-type: none"> Detail design for project conforming to the government's environmental and technical design standards Identify potential disposal sites. 	Included in the designs.	Included in the Contract document.	Bid document.	-	PM, PIU
Construction Phase						
I) Orientation for Contractors, Workers on environmental management. Drainage and Hydrological Impacts including storm water management.	<ul style="list-style-type: none"> PIU to conduct awareness training/ orientation on implementation of mitigation measures in the EMP. Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents 	Training	Whether conducted.	PIU	Not done.	None
II) Drainage and Hydrological Impacts including storm water management. - Omchu and Amochu rivers falls within the project area. Construction activities can affect/impact the river water quality due to erosion runoff. -	<p>Contractor will implement following measures to minimize the impacts.</p> <ul style="list-style-type: none"> During construction, the contractor will ensure the proper disposal of spoil and other wastes. Excavated construction spoil will be used for filling during road widening and embankment construction. All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries. covering of materials during transportation and spraying of water along haulage route. 	---	---	---	---	None
III) Materials exploitation & management.	In principle, the waste generation will be minimized at source.	Disposed spoil	Amount of spoils disposed.	Disposal site.	Not done.	None.
		Materials brought on sight.	Site visit	Construction Site	5 March 2018	K D 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
<ul style="list-style-type: none"> To minimize adverse environmental impacts of borrowing and quarrying <p>IV) Waste</p> <ul style="list-style-type: none"> Reduce spoils generation. Reduce, reuse and recycle waste to reduce contamination due to poor waste disposal practices <p>V) Hazardous substances - Uses and waste disposal</p>	<ul style="list-style-type: none"> Waste products will be segregated into bio-degradable and non-biodegradable and disposed in Thimphu Thromde's waste collection system. Recycling to be undertaken as far as possible. Any recyclable waste which cannot be reused during construction will be sold to licensed scrap dealers. Residual non-hazardous waste will be disposed-off in the municipal land fill. Construction/workers camps will be provided with sufficient refuse bins. Organic waste such as plant materials will be composted. Disposal of solid wastes into, rivers and other areas will be prohibited. Solid waste will only be disposed in Thimphu Thromde's designated areas such as landfills. Oil and lubricants will be safely stored. Secondary containment around fuel storage area will be ensured. Controls and standard operating procedures will be developed for the use of fuels and other hazardous substances to prevent spills, accidents and pilferage. 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. Fuel and other hazardous substances will be stored in safe and isolated areas provided with roof, impervious flooring and 	<p>No dusts emissions during transportation. Amount of waste generated.</p> <p>Methods of storage</p>	<p>Site visit</p> <p>Record of wastes generated.</p> <p>No spillage.</p>	<p>Construction Site</p> <p>-----do-----</p> <p>Store/depot.</p>	<p>Daily</p> <p>Daily</p> <p>5 March 2018</p>	<p>PIU</p> <p>----do---</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
VI) Air quality <ul style="list-style-type: none"> To minimize and reduce fugitive dust emissions and fumes from the construction vehicles. 	<ul style="list-style-type: none"> bund/containment wall to protect these from the spillage. Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labelled and safely stored. The spent oil and batteries will be sold to recycling dealers. Hazardous materials will be stored away from water bodies and above flood level. Clean-up operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste. 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. Fuel efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out. All vehicles and machinery used for construction should have valid pollution control certificates (emission tests certificates) 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. Paving approach roads where possible. 	Dust emission.	Visual	Construction sites	5 March 2018	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
VII) Noise •Minimize nuisance to community due to increased noise levels	<ul style="list-style-type: none"> Plan activities, in consultation with PIU, during periods of the day which will result in least disturbance; Restrain horn blowing unless it is necessary to warn other road users or animals. Ensure that noise levels do not exceed 5% of the NEC daytime noise level standards for residential and institutional areas. Works will not be conducted during night time. 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, Refraining from undertaking construction near schools during school hours or during examination periods, 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. 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. 	Noise at site.	Harshness of sound and no complaints from public.	Construction sites.	5 March 2018	KD Chamling
VIII) Camps construction and canteen facilities	<ul style="list-style-type: none"> 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. Adequate drinking water supply, basic food 	Drinking water supplies and electricity provided in camps.	Observation of camps	Camp sites.	5 March 2018	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
IX) Occupational Health and Safety <ul style="list-style-type: none"> Physical hazards 	<p>items, and cooking fuel (such as kerosene) will be provided to ward off competition on local resources.</p> <ul style="list-style-type: none"> For maintenance of proper health and hygiene adequate number of pit latrines and garbage cans will provided. Fishing, hunting and illegal tree felling will be totally prohibited. 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 carry out compensatory plantation with suitable local or native plant species. <ul style="list-style-type: none"> Routing of traffic to alternative roads where possible Where worker 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 Reduction of maximum vehicle speeds in working zones 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. Conducting training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees. The contractor will instruct workers in health and safety matters as required by law and by 	Safety equipment.	Safety gears issued and used.	Sites	5 March 2018	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
<ul style="list-style-type: none"> Chemical hazards 	<p>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.</p> <ul style="list-style-type: none"> Workers should use safety strap/belts where required. Fencing on all areas of excavation greater than 1m deep and sides of temporary works shall be observed. Contractor will at all-time keep the first aid kit at the construction sites. Contractor will be responsible for evacuation injured person to the nearest medical center and bear all the medical expenses Reflecting signals shall be installed on all construction vehicles and plant. <ul style="list-style-type: none"> Use correct asphalt product and ensure application at the correct temperature to reduce fuming of bitumen during normal handling Reduction of engine idling time at construction sites to prevent high accumulation of toxic fumes. Use of extenders or other means to direct exhaust away from the operator. Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel or other solvents 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. 	Protective clothing	No burns to workers.	Work site.	5 March 2018	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
<ul style="list-style-type: none"> Public Health and safety 	<ul style="list-style-type: none"> Provided safety barriers and proper signage at construction sites. Safe crossing areas should be designated and marked for pedestrians and cyclists. Barriers must be installed to deter pedestrians' access to construction sites, except at designated crossing points. Traffic calming devices and speed controls must be installed and maintained at pedestrian crossing sites. Construction activities will be timed and provision for safe passage of school children and elderly will be provided. Excavated trenches / ditches and freshly cut steep side slopes will be clearly marked and fenced for the safety of passersby and workers alike. Project or construction vehicles will be briefed on speed limit within sensitive areas such as schools, commercial and residential areas. 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. 	Signs and barriers.	No accidents.	Construction sites.	5 March 2018	KD Chamling
<ul style="list-style-type: none"> Traffic safety and management 	<ul style="list-style-type: none"> Traffic management plan for construction period to be developed Local communities to be informed about the traffic management measures that will be in place during the period of the construction. 	Signs and barriers.	No accidents.	Construction sites.	Daily	PIU / Contractor
Operational Phase						

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
1. Noise - prevent excess noise	<ul style="list-style-type: none"> Noise barrier will be installed if needed in future 	NA	NA	NA	NA	NA
2. Gaseous Emission - prevent air pollution	<ul style="list-style-type: none"> Ensuring that vehicles undertake mandatory pollution checking and maintenance procedures. Undertake air quality monitoring 	NA	NA	NA	NA	NA
3. Particulate emissions - Control level of particulates	<ul style="list-style-type: none"> The road surface will be maintained for smooth traffic flow and reduction of vehicular emission Undertake air quality monitoring 	NA	NA	NA	NA	NA
4. Soil erosion and water pollution	<ul style="list-style-type: none"> Storm water drainage to be maintained and surrounding vegetation to be maintained in good working condition. Routine cleaning of the existing drains and water bodies. 	NA	NA	NA	NA	NA
6. Driving conditions and community safety	<ul style="list-style-type: none"> Zebra crossings to be maintained (clear & visible). Pedestrian footpath to be properly maintained. 	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
Design Phase & Pre-Construction Phase						
1. Incorporate design measures to minimize environmental impacts	<ul style="list-style-type: none"> Detail design for project conforming to the government's environmental and technical design standards Identify potential disposal sites. 	Included in the designs.	Included in the Contract document.	Bid document.		PM, PIU
Construction Phase						
I. Orientation for Contractors, Workers on environmental management.	<ul style="list-style-type: none"> PIU to conduct awareness training/ orientation on implementation of mitigation measures in the EMP. Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents 	Training ---“---	Number of trainings conducted. ---do—	PIU/ Construction site office. --do—	Not done. 5 March'18	None K.D. Chamling
II. Drainage and Hydrological Impacts including storm water management. - Rivers Dungsum Chhu and Rikke chu falls within the project area. Construction activities can affect/impact the river water quality due to erosion runoff.	Contractor will implement following measures to minimize the impacts. <ul style="list-style-type: none"> During construction, the contractor will ensure the proper disposal of spoil and other wastes. All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries. 	Disposed spoils.	Amount of spoils disposed.	Disposal site.	Daily	PIU
III) Materials exploitation & management. <ul style="list-style-type: none"> To minimize adverse environmental impacts of borrowing and quarrying 	<ul style="list-style-type: none"> All construction materials, sand and stones to be procured from nearby government approved, existing and operational quarries. 	Materials brought on sight.	Transportation & material purchased challans.	Material stock yard	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
IV) Waste <ul style="list-style-type: none"> Reduce spoils generation. Reduce, reuse and recycle waste to reduce contamination due to poor waste disposal practices 	<ul style="list-style-type: none"> Covering of materials during transportation and spraying of water along haulage route. <p>In principle, the waste generation will be minimized at source.</p> <ul style="list-style-type: none"> Waste products will be segregated into bio-degradable and non-biodegradable and disposed in SJ Thromde's waste collection system. 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 Any recyclable waste which cannot be reused during construction will be sold to licensed scrap dealers. Residual non-hazardous waste will be disposed-off in the municipal land fill. Construction/workers camps will be provided with sufficient refuse bins. Organic waste such as plant materials will be composted. Animal carcasses will be collected in a timely manner and buried; 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. 	<p>No dusts emissions during transportation.</p> <p>Amount of waste generated.</p>	<p>Visual assessment.</p> <p>Record of wastes generated.</p>	<p>During transportation.</p> <p>Construction sites and camps.</p>	<p>Daily</p> <p>Daily.</p>	<p>PIU</p> <p>PIU</p>
V) Hazardous substances <ul style="list-style-type: none"> Uses and waste disposal 		<p>Methods of storage</p>	<p>No spillage.</p>	<p>Store/depot.</p>	<p>5 March 2018</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
VI) Air quality <ul style="list-style-type: none"> To minimize and reduce fugitive dust emissions and fumes from the construction vehicles. 	<ul style="list-style-type: none"> Oil and lubricants will be safely stored. Secondary containment around fuel storage area will be ensured. 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. 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. 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. Hazardous materials will be stored away from water bodies and above flood level. Clean-up operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste. 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. 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. 	Dust emission.	Visual	Construction sites	5 March 2018	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
VII) Noise <ul style="list-style-type: none"> Minimize nuisance to community due to increased noise levels 	<ul style="list-style-type: none"> Fuel efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out. All vehicles and machinery used for construction should have valid pollution control certificates (emission tests certificates) 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 will be established and agreed with the PMU. 	Noise at site.	Harshness of sound and no complaints from public.	Construction sites.	5 March 2018	KD Chamling
VIII) Camps construction and canteen facilities	<ul style="list-style-type: none"> 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, Refraining from undertaking construction near schools during school hours or during examination periods, 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. Avoid camp construction too close to the local communities to avoid unwanted interference to the way of living of the local 	Drinking water supplies and electricity provided in camps.	Observation of camps	Camp sites.	5 March 2018	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
IX) Occupational Health and Safety <ul style="list-style-type: none"> Physical hazards 	<p>communities. Camps location to be consulted with PIU.</p> <ul style="list-style-type: none"> Adequate drinking water supply, basic food items, and cooking fuel (such as kerosene) will be provided to ward off competition on local resources. For maintenance of proper health and hygiene adequate number of pit latrines and garbage cans will be provided. Fishing, hunting and illegal tree felling will be totally prohibited. After completion of construction, the abandoned campsite will be cleaned and restored to the original state with appropriate bioengineering works using local plant species. <ul style="list-style-type: none"> Routing of traffic to alternative roads where possible 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 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. Conducting training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees. The contractor will instruct workers in health and safety matters as required by law and by 	Safety equipment.	Safety gears issued and used.	Sites	5 March 2018	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
<ul style="list-style-type: none"> Chemical hazards 	<p>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.</p> <ul style="list-style-type: none"> Workers should use safety strap/belts whenever and wherever required.. Fencing on all areas of excavation greater than 1m deep shall be done. Contractor will at all-time keep the first aid kit at the construction sites. Contractor will be responsible for evacuation of injured person to the nearest medical center and bear all the medical expenses Reflecting signals shall be installed on all construction vehicles and plant. <ul style="list-style-type: none"> Reduction of engine idling time at construction sites to prevent high accumulation of toxic fumes. Use of extenders or other means to direct exhaust away from the operator. Use of protective clothing when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel or other solvents 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. <ul style="list-style-type: none"> Provided safety barriers and proper signage at construction sites. 	Protective clothing	No burns to workers.	Work site.	5 March 2018	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
<ul style="list-style-type: none"> Public Health and safety Traffic safety and management 	<ul style="list-style-type: none"> Barriers must be installed to deter pedestrians' access to construction sites, except at designated crossing points. Traffic must be adequately regulated (eg through signs, signals, markings) near critical pedestrian zones or bikeways. Excavated trenches / ditches and freshly cut steep side slopes will be clearly marked and fenced for the safety of passersby and workers alike. Project or construction vehicles will be briefed on speed limit within sensitive areas such as schools, commercial and residential areas. 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. <p>Local communities to be informed about the traffic management measures that will be in place during the period of the construction.</p> <ul style="list-style-type: none"> Traffic management plan for construction period to be developed Local communities to be informed about the traffic management measures that will be in place during the period of the construction. 	<p>Signs and barriers.</p> <p>Signs and barriers.</p>	<p>No accidents.</p> <p>No accidents -</p>	<p>Construction sites.</p> <p>Construction sites.</p>	<p>5 March 2018</p> <p>Periodically</p>	<p>KD Chamling</p> <p>PIU / Contractor</p>
Operational Phase						

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
1. Noise - prevent excess noise	<ul style="list-style-type: none"> Noise barrier will be installed if needed in future 	NA	NA	NA	NA	NA
2. Gaseous Emission - prevent air pollution	<ul style="list-style-type: none"> Ensuring that vehicles undertake mandatory pollution checking and maintenance procedures. Undertake air quality monitoring 	NA	NA	NA	NA	NA
3. Particulate emissions - Control level of particulates	<ul style="list-style-type: none"> The road surface will be maintained for smooth traffic flow and reduction of vehicular emission Undertake air quality monitoring 	NA	NA	NA	NA	NA
4. Soil erosion and water pollution	<ul style="list-style-type: none"> Storm water drainage to be maintained and surrounding vegetation to be maintained in good working condition. Routine cleaning of the existing drains and water bodies. 	NA	NA	NA	NA	NA
7. Driving conditions and community safety	<ul style="list-style-type: none"> Zebra crossings to be maintained (clear & visible). Pedestrian footpath to be properly maintained. 	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	Yes	Yes	Satisfactory	None
3	Water Supply	Yes	Yes	Satisfactory	None

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.

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.
 - Construction of footpaths and drains are only the ongoing works.
- 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 the contractors have stock piled his construction materials, such as sand, cement and rods. The excavated spoils/soils have been disposed off to pre-identified sites.. Hence their disposals are not a major concern.
- 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, wherever required 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.
- Briefly discuss the basis for environmental parameters monitoring.
- Indicate type of environmental parameters to be monitored and identify the location.
- Indicate the method of monitoring and equipment used.
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements.

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

Air Quality Results⁷

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3
-	-	-	-	-	-
-	-	-	-	-	-

⁷ No monitoring and analysis of Air Quality results have been carried out.

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 $\mu\text{S/cm}$	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 3**.

Noise Quality Results⁸

Site No.	Date of Testing	Site Location	LA _{eq} (dBA) (Government Standard)	
			Day Time	Night Time

Note: The PIU nor the Thromde is equipped to carry out these tests. 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.

⁸ No monitoring and analysis of Noise Quality Results have been carried out.

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 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 12th March 2018, all the packages have been awarded and works is in progress. However, some activities under each component are yet to be awarded. **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 12 th March 2018
1	Component 1: - WWTP	Babesa LAP , Thimphu	10/Nov/2016	30	9/May/2019	80%
2	Component 2: - Bridge	Over Om Chhu, near Youth Center, Phuentsholing.	17/August/2017	18	17/Feb/2019	30%
3	Component 3: - Water supply	Rikkechhu at Pinchinang (Char kilo), S. Jongkhar	1/5/2016	18	31/10/2017* Or 30 April 2018	80%



** six months' time extension given and the new date of completion corresponds to end April 2018.*

10. APPENDICES

- a) Appendices
- b) Photographs
- c) Environmental Criteria and Standards

a) Appendices

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

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དཔལ་ལྷན་འབྲུག་གཞུང་།
National Environment Commission
Royal Government of Bhutan

NECS/CMD/Thimphu Thromde/2568/2016/787
May 16, 2016

ENVIRONMENTAL CLEARANCE

The National Environment Commission Secretariat (NECS) is pleased to renew environmental clearance in respect of the Thimphu District Municipality as approved during the meeting held on May 12, 2016 for the installation and operation of Waste Water Treatment Plant at Babesa under Thimphu Thromde with the following terms and conditions:

1. As per section 28.3 of the Regulation for the Environmental Clearance of Projects 2002, any modification of proposal/application shall take place only with prior approval from NECS;
2. **The holder shall ensure that this environmental clearance is valid only for the installation and operation of Waste Water Treatment Plant (WWTP) at Babesa under Thimphu Thromde;**
3. The holder shall ensure that the installation and operation of the WWTP is in line with the National Environment Protection Act 2007, Environment Assessment Act 2000 and its Regulation 2002, Waste Prevention & Management Act of Bhutan 2009 and its Regulation 2012 and The Water Act of Bhutan 2011;
4. The holder shall ensure that the installation and operation of the WWTP complies with the Environmental Standards 2010;
5. The holder shall ensure strict compliance to the Undertaking submitted to NECS;
6. The holder shall ensure compliance to all terms and conditions of stakeholder clearances at all times;
7. The holder shall ensure that the operation of WWTP is carried out as per the application submitted for environmental clearance;
8. **The holder shall ensure that the installed capacity of the WWTP is 14 Million Liter Per Day as stated in the application;**
9. The holder shall ensure that use of ozone depleting substances are restricted in line with the revised Regulation on Control of Ozone Depleting Substances, 2008;
10. The holder shall ensure that polychlorinated biphenyl is never used as transformer and capacitor oil;
11. The holder shall ensure that installation and operation of the WWTP is within the allocated area;
12. The holder shall ensure that local residents, households, communities, public, private parties and any religious, cultural, historic and ecologically important sites are not adversely affected by the activity;
13. The holder shall be solely responsible for any dispute arising from the installation and operation of the WWTP;
14. The holder shall ensure that import and use of secondhand equipment and machineries are strictly prohibited;
15. The holder shall ensure that import and use of hazardous wastes are strictly prohibited;
16. The holder shall ensure that NECS and any other relevant authorities are informed of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious or ecological importance;
17. **The holder shall ensure that the existing WWTP is fully decommissioned and converted into recreational area once the new WWTP is commissioned as stated in**

19/5/16

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www.nec.gov.bt

- the application;
18. The holder shall ensure that the construction sites are completely barricaded prior to starting any activity to avoid adverse visual impacts during constructions;
 19. The holder shall ensure that all excavated materials are re-used or disposed within the premise as stated in the application;
 20. The holder shall ensure that spillage and roll over of excavated materials are avoided at all times;
 21. The holder shall ensure that sludge generated from the WWTP is used as manure/soil conditioner if found non toxic;
 22. The holder shall ensure that disposal of sludge in water bodies and other surrounding environment is avoided at all times;
 23. The holder shall ensure that the activity doesn't lead to blockage, storage or diversion of river, stream, irrigation channel, waterfall, underground water source or any other water resource or water course;
 24. The holder shall ensure that untreated effluent is not discharged into the surrounding environment;
 25. The holder shall ensure that proper records are maintained for effluent discharges and submitted to NECS quarterly;
 26. The holder shall ensure that fugitive emissions from the activities are controlled using appropriate measures;
 27. The holder shall 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;
 28. The holder shall ensure that no foul odour is emitted from the WWTP;
 29. The holder shall ensure that the operation of WWTP is closely monitored to avoid malfunction and breakdown and ultimately avoid nuisance due to foul odour at any point of time;
 30. The holder shall ensure that adequate safety gadgets and outfits such as safety helmets, eye goggles, breathing masks, ear muffs, safety boots, etc, are provided to all the workers and any other person entering the WWTP;
 31. The holder shall ensure that safety signs are posted at strategic locations within the WWTP premises indicating areas where specific safety gadgets are required;
 32. The holder shall ensure that adequate lighting and ventilation facilities are provided within the WWTP;
 33. The holder shall ensure that general housekeeping, cleanliness and hygiene are maintained at all times in the WWTP;
 34. The holder shall ensure that first-aid kit is available in the WWTP at all times;
 35. The holder shall ensure that adequate space is maintained within the WWTP premises to facilitate mobility;
 36. The holder shall ensure that adequate fire fighting facilities are installed and expiry dates of such facilities are checked and kept valid at all times;
 37. The holder shall ensure that proper health check up facilities are provided to all employees and health records are maintained;
 38. The holder shall ensure that underage workers are not employed at all times;
 39. The holder shall 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 of the area;
 40. The holder shall ensure that adequate sanitation facilities are provided to workers and employees;
 41. The holder shall ensure that separate budget is maintained for environmental activities;

42. The holder shall ensure that signboard is erected at the work site displaying the name of the Project and contact address of the implementing agency;
43. The holder shall ensure that a copy of this environmental clearance is available at the work site at all times;
44. The holder shall develop contingency plan to deal with unforeseen environmental risks, hazards & accidents and submitted to NECS within three months from the date of renewal of this environmental clearance;
45. **The holder shall ensure that renewal of this environmental clearance is processed at least one month prior to its expiry along with a copy of environmental clearance and a report on the implementation of its terms and conditions;**
46. The holder shall develop detailed implementation plan focusing on the terms and conditions of this environmental clearance and submitted to NECS within three months from the date of renewal of this environmental clearance; and
47. The holder shall ensure strict implementation of the terms and conditions of this environmental clearance at all times.

Failure to comply with any of the above terms and conditions shall constitute an offence under the Environmental Assessment Act 2000, its Regulations 2002, the National Environment Protection Act 2007 and any other relevant laws. Penalties for such offences shall include but not limited to suspension and/or revocation of environmental clearance in part or whole without any liability on the part of the Royal Government.

This environmental clearance is valid till May 15, 2019 and is subject to periodic review and changes.


Secretary

To,
The Executive Secretary,
Thimphu District Municipality,
Post Box No- 215,
Thimphu- 11001

Copy to:

1. The Dzongkhag Environment Officer, Dzongkhag Administration, Thimphu for necessary action.
2. Guardfile (Thimphu Throinde), CMD, NECS for record.

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

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"Construction Industry: Solutions through innovation and improved technology"
MoWHS/ PPD/Env/01/2017/༠༩
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

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Fax: 00975-2-323121
Po Box: 791

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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

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

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The holder shall:

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2. put appropriate measures to avoid erosion and landslides.

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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་ཏྲོག་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
Phuentsholing 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

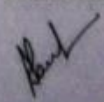
Po Box: 791

Annex – 3: Effluent Water Analysis, Raw Sewage water, WWTP- Thimphu Thromde
(i) Sample Collection time- 9.00 a.m.

 ENVIROCHECK		Environmental Laboratory 189 & 190, Rastraguru Avenue, Kolkata-700 028 Phone : 2579-2889/2891, 2549-7490 Fax : 2529-9141 E-mail : envcheck@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(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 nd 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]

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 ⁴
19. Faecal Coliform (CFU/100 ml.)	5.84 x 10 ⁴
20. Specific Gravity of Grit	2.90
21. Quantity of Grit in Raw Sewage (mg./100 ml.)	1.5
22. Oxygen Absorption (KMnO ₄) (mg./l)	45.0

*Sand (%) - 40.0, Silt - 30%, 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)

(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 : envcheck@cal2.vsnl.net.in

EFFLUENT WATER ANALYSIS REPORT

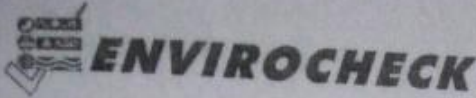
1.	Name of the Industry	: Technofab Engineering Ltd.
2.	Address	: Plot No.05, Sector 27-C, Faridabad - 121003
3.	Report No.	: Env/554/W/M(ii)/16-17
4.	Date of sampling	: 28.01.2017
5.	Reporting date	: 08.02.2017
6.	Type of sample	: Domestic Effluent Water
7.	Collection & preservation of sample	: APHA 22 nd 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 ⁴
19. Faecal Coliform (CFU/100 ml.)	8.4 x 10 ⁴
20. Specific Gravity of Grit	2.80
21. Quantity of Grit in Raw Sewage (mg./100 ml.)	1.2
22. Oxygen Absorption (KMnO ₄) (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.



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 nd 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 Khjeldhal 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 ⁵
19.	Feacal Coliform (CFU/100 ml.)	1.168 x 10 ⁵
20.	Specific Gravity of Grit	2.70
21.	Quantity of Grit in Raw Sewage (mg./100 ml.)	1.0
22.	Oxygen Absorption (KMnO ₄) (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 – 4: Environmental Management Plan, WWTP –Thimphu Thromde

REGISTERED OFFICE
507 Eras Apartments, 56 Nehru Place
New Delhi-110 019, India
Tel : +91-11-26411931, 26415961
Fax : + 91-11-26221521
Email : info@technofabengineering.com
CIN:L74210DL1971PLC005712

**TECHNOFAB
ENGINEERING LIMITED**

December 18, 2017

D: O: 3600/TE/2017-18/46

Mr. Kinley Penjore
Project Manager
ThimphuThromde
Thimphu – 11001,
Bhutan

CONTRACT Ref.: Contract No. TCC/WTPP/GM/001 – Design, Build, Operate and Transfer 12 MLD at WWTP at Thimphu, Bhutan

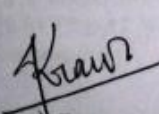
Subject : Submission of Environmental management plan/Monitoring report.

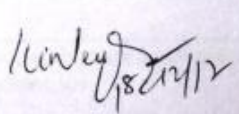
Dear Sir,

This has reference to the above subject; we are submitting the Environmental management/monitoring report for information and record.


Thanking you and assuring you our best services at all times.

Yours faithfully,
ForTECHNOFAB ENGINEERING LIMITED



Atul Gaur
Construction Manager



Copy of Technofab THIMPHU THROMDE-018 letter.doc
CORPORATE ENGINEERING & PROJECTS OFFICE
Plot No. 5, Sector 27C, Mathura Road
Faridabad-121003 (NCR),Haryana, India



Tel : +91-129-2270202, 2275310
Fax : +91-129-2270201
www.technofabengineering.com



Sl. No	Activities	Mitigation Measures	Responsibility		
			Implementation	Supervision / Monitoring	Remarks
9	The holder shall ensure that the use of ozone depleting substances are restricted in line with the revised Regulation on Control of Ozone Depleting Substances, 2008.	TE will abide as per contract/Revised Regulation on control of Ozone depleting substance 2008	TE	TT	
10	The holder shall ensure that polychlorinated biphenyl is never used as transformer and capacitor oil;	TE will abide as per contract and ensure for never used prohibited oil or compound in Transformer & Capacitor	TE	TT	
11	The holder shall ensure that installation and operation of the WWTP is within the allocated area;	TE will abide as per contract and ensure for installation & operation of the WWTP within the allocated area.	TE	TT	
12	The holder shall ensure that local residents, household, communities, public, private parties and any religious, cultural, historic and ecologically important sites are not adversely affected by the proposed activity.	TE will abide as per contract and ensure for not affecting the public, local residents and ecologically important sites by the proposed activity	TE	TT	
13	The holder shall be solely responsible for any dispute arising from the installation and operation of the WWTP.	TE will abide as per contract and responsible for any dispute arising from the installation & operation of the WWTP	TE	TT	
14	The holder shall ensure that import and use of secondhand equipment and machineries are strictly prohibited;	TE will abide as per contract and ensure for not importing and use of prohibited equipment / machineries	TE	TT	
15	The holder shall ensure that import and use of hazardous wastes are strictly prohibited;	TE will abide as per contract and ensure for not importing and use of prohibited hazardous waste	TE	TT	
16	The holder shall ensure that NECS and any other relevant authorities are informed of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious or ecological importance;	TE will abide as per contract and ensure for informing to NECS & any other relevant authorities for any unanticipated or unforeseen matter, precious metals or minerals or articles of economic, cultural, religious or ecological importance.	TE	TT	

Sl. No	Activities	Mitigation Measures	Responsibility		
			Implementation	Supervision / Monitoring	Remarks
17	The holder shall ensure that the existing WWTP is fully decommissioned and converted into recreational area once the new WWTP is commissioned as stated in the application;	TE will abide as per contract and ensure for not importing and use of prohibited hazardous waste	TE	TT	
18	The holder shall ensure that the construction sites are completely barricaded prior to starting any activity to avoid adverse visual impacts during constructions.	TE will abide as per contract and ensure for barricading the construction site prior to starting any activity	TE	TT	
19	The holder shall ensure that all excavated materials are re-used or disposed within the premise as stated in the application.	TE will abide as per contract and ensure for re-using & disposing the excavated materials within the premise of WWTP	TE	TT	
20	The holder shall ensure that spillage and roll over of excavated materials are avoided at all time;	TE will abide as per contract and ensure for avoiding the spillage and roll over of excavated materials at all time	TE	TT	
21	The holder shall ensure that sludge generated from the WWTP is used as manure/soil conditioner if found non toxic;	TE will abide as per contract and ensure to use generated sludge from WWTP as manure / soil conditioner if found non toxic	TE	TT	
22	The holder shall ensure that disposal of sludge in water bodies and othersurrounding environment is avoided at all times;	TE will abide as per contract and ensure to avoid disposal of sludge in water bodies and other surrounding environment at all times	TE	TT	
23	The holder shall ensure that the proposed activity doesn't lead to blockage, storage or diversion of river, stream, irrigation channel, waterfall, underground water source or any other water resource or water course.	TE will abide as per contract and ensure to avoid blockage, storage or diversion of river, stream, irrigation channel, waterfall, underground water source or any other water resource or water course by any proposed activity	TE	TT	
24	The holder shall ensure that untreated effluent is not discharged into the surrounding environment.	TE will abide as per contract and ensure that untreated effluent is not discharged into the surrounding environment;	TE	TT	

Sl. No	Activities	Mitigation Measures	Responsibility		
			Implementati on	Supervision / Monitoring	Remarks
25	The holder shall ensure that proper records are maintained for effluent discharges and submitted to NECS quarterly;	TE will abide as per contract and ensure that proper records are maintained for effluent discharges and submitted to NECS quarterly;	TE	TT	
26	The holder shall ensure that fugitive emissions from the activities are controlled using appropriate measures;	TE will abide as per contract and ensure that fugitive emissions from the activities are controlled using appropriate measures;	TE	TT	
27	The holder shall 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;	TE will abide as per contract and 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;	TE	TT	
28	The holder shall ensure that no foul odour is emitted from the WWTP;	TE will abide as per contract and ensure that no foul odour is emitted from the WWTP;	TE	TT	
29	The holder shall ensure that the operation of WWTP is closely monitored to avoid malfunction and breakdown and ultimately avoid nuisance due to foul odour at any point of time;	TE will abide as per contract and ensure that the operation of WWTP is closely monitored to avoid malfunction and breakdown and ultimately avoid nuisance due to foul odour at any point of time;	TE	TT	
30	The holder shall ensure that adequate safety gadgets and outfits such as safety helmets, eye goggles, breathing masks, ear muffs, safety boots, etc. are provided to all the workers and any other person entering the WWTP;	TE will abide as per contract and ensure that adequate safety gadgets and outfits such as safety helmets, eye goggles, breathing masks, ear muffs, safety boots, etc. are provided to all the workers and any other person entering the WWTP;	TE	TT	
31	The holder shall ensure that safety signs are posted at strategic locations within the WWTP premises indicating areas where specific safety gadgets are required;	TE will abide as per contract and ensure that safety signs are posted at strategic locations within the WWTP premises indicating areas where specific safety gadgets are required;	TE	TT	
32	The holder shall ensure that adequate lighting and ventilation facilities are provided within the WWTP;	TE will abide as per contract and ensure that adequate lighting and ventilation facilities are provided within the WWTP;	TE	TT	

Sl. No	Activities	Mitigation Measures	Responsibility		
			Implementati on	Supervision / Monitoring	Remarks
33	The holder shall ensure that general housekeeping, cleanliness and hygiene are maintained at all times in the WWTP;	TE will abide as per contract and ensure that general housekeeping, cleanliness and hygiene are maintained at all times in the WWTP;	TE	TT	
34	The holder shall ensure that first-aid kit is available in the WWTP at all times;	TE will abide as per contract and ensure that first-aid kit is available in the WWTP at all times;	TE	TT	
35	The holder shall ensure that adequate space is maintained within the WWTP premises to facilitate mobility;	TE will abide as per contract and ensure that adequate space is maintained within the WWTP premises to facilitate mobility;	TE	TT	
36	The holder shall ensure that adequate fire fighting facilities are installed and expiry dates of such facilities are checked and kept valid at all times;	TE will abide as per contract and ensure that adequate fire fighting facilities are installed and expiry dates of such facilities are checked and kept valid at all times;	TE	TT	
37	The holder shall ensure that proper health check up facilities are provided to all employees and health records are maintained;	TE will abide as per contract and ensure that proper health check up facilities are provided to all employees and health records are maintained;	TE	TT	
38	The holder shall ensure that underage workers are not employed at all times;	TE will abide as per contract and ensure that underage workers are not employed at all times;	TE	TT	
39	The holder shall 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 of the area;	TE will abide as per contract and 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 of the area;	TE	TT	
40	The holder shall ensure that adequate sanitation facilities are provided to workers and employees;	TE will abide as per contract and ensure that adequate sanitation facilities are provided to workers and employees;	TE	TT	
41	The holder shall ensure that separate budget is maintained for environmental activities;	TE will abide as per contract and ensure that separate budget is maintained for environmental activities;	TE	TT	

Sl. No	Activities	Mitigation Measures	Responsibility		
			Implementati on	Supervision / Monitoring	Remarks
42	The holder shall ensure that signboard is erected at the work site displaying the name of the project and contact address of the implementing agency;	TE will abide as per contract and ensure that signboard is erected at the work site displaying the name of the project and contact address of the implementing agency;	TE	TT	
43	The holder shall ensure that a copy of this environmental clearance is available at the work site at all times;	TE will abide as per contract and ensure that a copy of this environmental clearance is available at the work site at all times;	TE	TT	
44	The holder shall develop contingency plan to deal with unforeseen environmental risks, hazards & accidents and submitted to NECS within three months from the date of issue of this environmental clearance	TE will abide as per contract and develop contingency plan to deal with unforeseen environmental risks, hazards & accidents and submitted to NECS within three months from the date of issue of this environmental clearance	TE	TT	
45	The holder shall ensure that renewal of this environmental clearance is processed at least one month prior to its expiry along with a copy of environmental clearance and a report on the implementation of its terms and conditions;	TE will abide as per contract and ensure that renewal of this environmental clearance is processed at least one month prior to its expiry along with a copy of environmental clearance and a report on the implementation of its terms and conditions;	TE	TT	
46	The holder shall develop detailed implementation plan focusing on the terms and conditions of this environmental clearance and submitted to NECS within three month from the date of issue of this environmental clearance; and	TE will abide as per contract and develop detailed implementation plan focusing on the terms and conditions of this environmental clearance and submitted to NECS within three month from the date of issue of this environmental clearance; and	TE	TT	
47	The holder shall ensure strict implementation of the terms and conditions of this environmental clearance at all times	TE will abide as per contract and ensure strict implementation of the terms and conditions of this environmental clearance at all times	TE	TT	

Annex – 5: Monthly Safety Report, WWTP-Thimphu Thromde.

REGISTERED OFFICE
507 Eros Apartments, 56 Nehru Place
New Delhi-110 019, India
Tel : +91-11-26411931, 26415961
Fax : + 91-11-26221521
Email : info@technofabengineering.com
CIN:L74210DL1971PLC005712

**TECHNOFAB
ENGINEERING LIMITED**

D: O: 3600/TE/2017-18/46 **March 08, 2018**

Mr. Kinley Penjore
Project Manager
ThimphuThromde
Thimphu – 11001,
Bhutan

CONTRACT Ref.: Contract No. TCC/WTPP/GM/001 – Design, Build, Operate and Transfer 12 MLD at WWTP at Thimphu, Bhutan

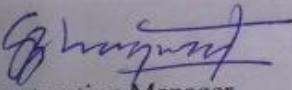
Subject : Submission of Monthly safety report.

Dear Sir,

This has reference to the above subject; we are submitting the Monthly safety report for the month of February for information and record.

Thanking you and assuring you our best services at all times.

Yours faithfully,
ForTECHNOFAB ENGINEERING LIMITED


Construction Manager

STATE, ENGINEERING & PROJECTS OFFICE
D:\Technofab\THIMPHU THROMDE-01
to: S. Sector 27C, Mathura Road
bad-121003 (NCR), Haryana, India

Tel: +91-129-2270202, 2275310
Fax : +91-129-2270201
www.technofabengineering.com

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GLORIOUS YEARS

**Royal Government of Bhutan Ministry of works and Human Settlement
Thimphu Thromde Urban Infrastructure Development project.
Contract package No.:TCC/WWTP/GM/001**

MONTHLY HEALTH, SAFETY & ENVIRONMENT (HSE) REPO

Actual work start Date: 19 Number 2016

For the Month of: **February 2018**

Title of Job/Operation: 12 MLD WWTP, BABESA

Report No: 06

Name of the **Contractor: Technofab-Vishwa (JV)**

Date of Submission: **08-03-2018**

Name of safety EHS/Engineer/Officer: Amit kumar Sharma

ITEM	THIS MONTH	CUMULATIVE
Total Strength (Staff + Workmen)	90	370
Number of HSE meetings organised at site	NIL	NIL
Number of HSE awareness programmes conducted at site	01 (HIV)	02
Number of Loss Time Accidents (Other than Fatal)	NIL	NIL
Other accidents (Non Loss Time)	NIL	NIL
Total No. of Accidents	NIL	NIL
Total man-hours worked	20,088	88,670
Man-hour loss due to fire and accidents	NIL	NIL
Compensation cases raised with Insurance	NIL	NIL
Compensation cases resolved and paid to workmen	NIL	NIL
Remarks	NIL	NIL

Performance Indicators

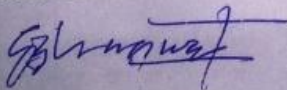
Injuries & Illness	Recordable Incidents	Fatal	Nil	Nil
		Medical Aid	Nil	Nil
		Days away from work	Nil	Nil
		Restricted Workday case	Nil	Nil
		First-aid case	Nil	Nil
Near miss		Nil	Nil	
Property Damage		Nil	Nil	
Environmental Damage		Nil	Nil	
Motor Vehicle Incident		Nil	Nil	

Brief description of the incident during the Month (if any):

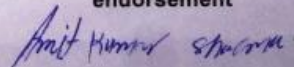
Safety Metrics

Safety Induction	14	131
Tool Box Talks	01	12
Safety Training	00	04
Positive SOR (Safety Observation report)	00	00
Other SOR	00	00
Safety Inspection	00	01
Safety Audit	00	01
Safe Plan of Action (SPA)	00	01
Safety Meeting	00	02
House keeping	01	08
Water sprinkling	02	33

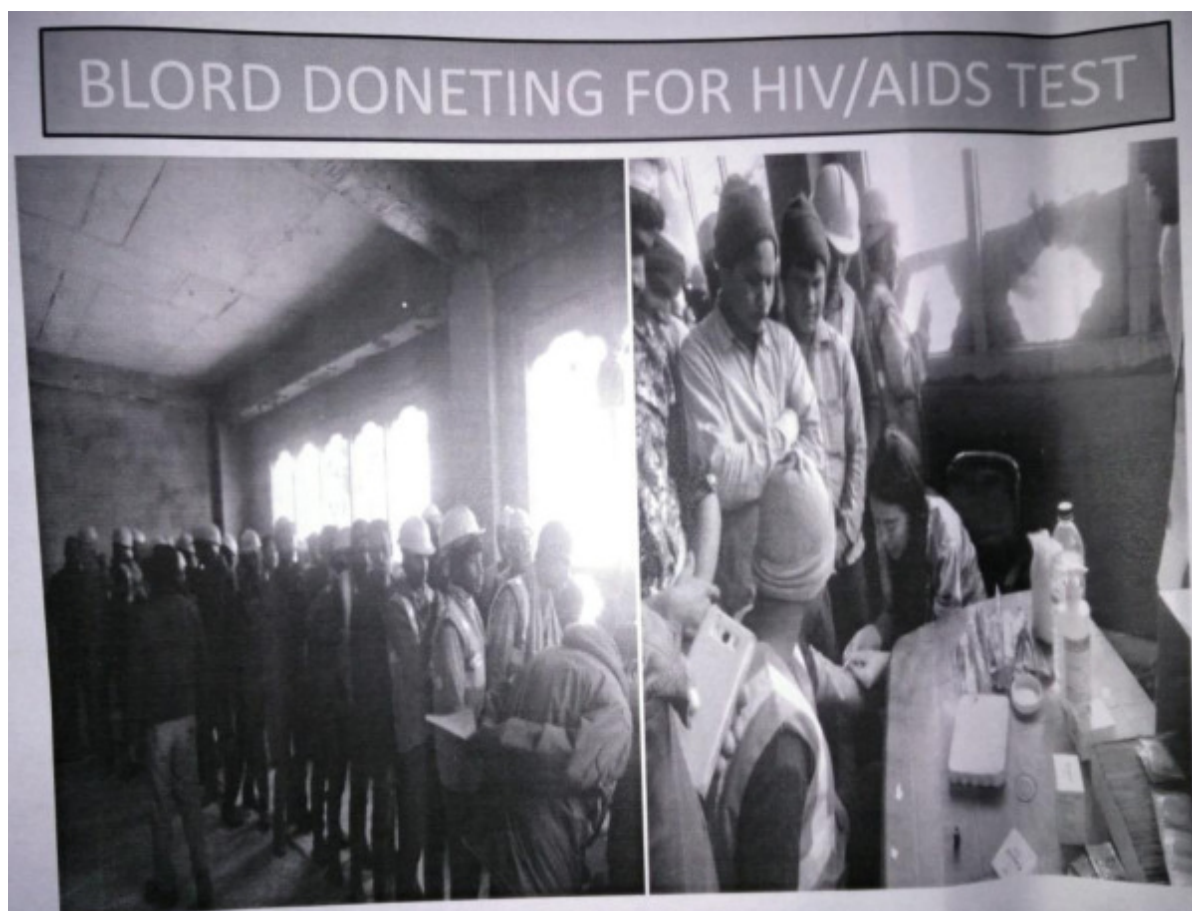
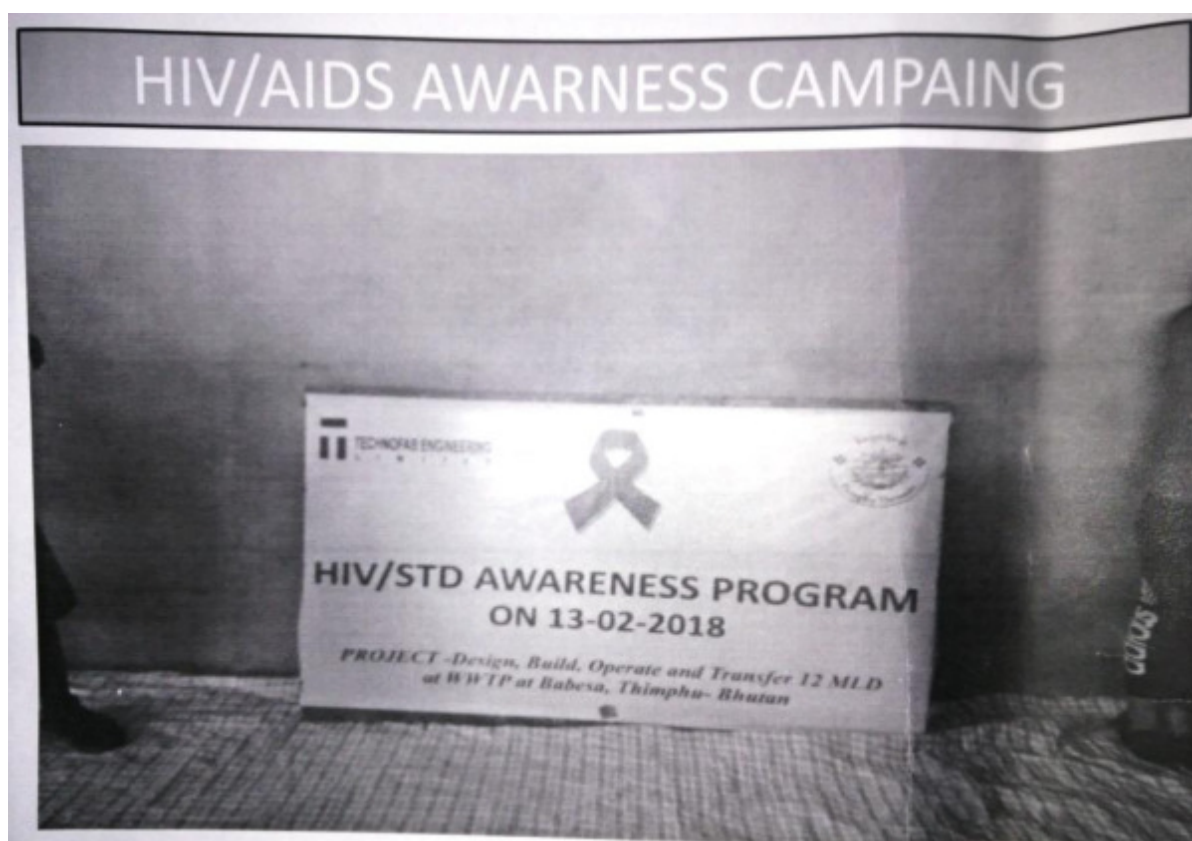
Contractor's CM endorsement
Date of Submission



Contractor's Safety officer/Engineer
endorsement



Annex -7: HIV/AIDS campaign program, WWTP-Thimphu Thromde.



HIV/AIDS AWARENESS CAMPAIGN
ADB TA-2816 BHUTAN
URBAN INFRASTRUCTURE PROJECT

Issue: WWTP, Project Site Office, Babesa Thangpa Date: 13.02.2018

ATTENDANCE SHEET

PRINTED NAME	SEX M/F	AGE	VILLAGE/ORGANIZATION & DESIGNATION	SIGNATURE THUMP PRINT
Monorad din	M	40		
Shahid Alam	M	21		
Revinat	M	22		
Bishnu	M	25		
Mohul Hek	M	24		
Shakil Ali	M	28		
Ishad Alam	M	23		
Faridat Islam	M	40		
Hemshad Mia	M	35		
Shahidin	M	25		Shakil Ali
Sajad	M	24		Sajad
Astkar Ali	M	55		
Faigul Mia	M	34		
Abdul Kabir	M	51		Abdul Kabir
Jin Reel	M	30		JIFARUZMA
Mai das	M	28		MAI DAS
Matalab Husein	M	33		MATALAB HUSEIN

Abul Haque	M	24	
Akmal	M	28	
Alam Mustafa	M	28	mustafa
Alul Anjid	M	30	
Amir Anand	M	19	
Amir Ahmad	M	20	
Arif Ahmad	M	20	
Ashish Bhagat	M	27	ASHISH
Aziz Ahmad	M	28	Faiz
Imamul Razwan	M	24	Mohd Razwan
U Shafy	M	23	Mohd. Shafy
Astut Rashid	M	20	As Rashid
Ali Ali	M	20	Imtiyaz Ali
Amir Hussain	M	23	SUDAMHUSAIN
K. I Hussain	M	20	SHARIL
Imamul Hussain	M	25	
Zir Hussain	M	30	
Akmal Kussil	M	35	ASHIQ
Abul Haque	M	31	Abul Haque
Abul Urac	M	22	Abul Urac
Amir Ekka	M	23	
Abul Urac	M	21	





Man Mia	M	23		Uttara-Uttara
Afikah Mia	M	23		Sabir Mia
Sujit Panna	M	24		Sujit Panna
Ajit Panna	M	20		Ajit Panna
Tanvir Ahmed	M	35		Tanvir
Bhagya Dangi	M	47		17596911
Sonam Tinkri	M	45		17777728
Kamrul Haque	M	40		Kamrul Haque
Abjal Hussain	M	35		
Ran Bredur	M	40	17702388	Ran
Jankho	M	60	17637074	Jankho
Deo Raj	M	27		Deo
Lhakpa Dangi Tanning	M	27	17868978	Lhakpa
Kinley Tenzin	M	19	17414699	Kinley
Rewas Kharka	M	203	17515886	Rewas
Santa Norbu Dangi	M	25	17908480	Santa
Passang Dangi	M	30	17517145	Passang
Bikash Gurung	M	33	17846806	Bikash
Bikash Gurung	M	27	17989208	Bikash
Nima Zangmo	F	23	17480570	Nima
Sonam Choden	F	21	17397461	Sonam
Abubakar Siddique	M	45		Abubakar






nam Choden	F	29	77777557	
ias Hogue	M	20		Tues Au Huel
dul Kader	M	20		Abdul Kader
shil Urao	M	23		Sahel Urao
Shir Momyar jaman	M	23		Agamon
RAJESH	M	28	Staff	Mahul
Hlesh Kumar	M	42	Staff	
nlosh. Kumar	M	29	Staff	Sahel
MIRISH BHAKHAT	M	53	Staff	
useib Ali	M	45		
ITUL GAUR	M	44	77200985	Khand
IST KUMAR SHAKHAT	M	25	EMS ENGL	
nem Gyaksho Dorji	M	25	Eng.	
ASHI DORJI	M	37	PIU, ADB, 77	7/8/3 On
ma Dorji	M	25	17112287 (HISC)	R. J.
nam Choden	M	25	17320972 (HISC)	Munif
ochem	F	37	12111495 (HISC)	
awang Chorda	M	56	17613553 (HISC)	
Tenzin	M	47	17803753	
Wang Phuntscho (PRCS)	M	49	77614714	
abri Pradhan	M	24	17922910	Babu
ajit Pradhan	M	53	17603661	Mogha





b) Photographs





Annex 7: Photographs from Field Visits for Components 1, 2, & 3.





Sl. No	Name of work/activities	Present status	Picture reference	Remarks
Component 1: Thimphu Thromde Construction of Waste Water Treatment Plant.				
1	Erection of signage.	Completed.		Sign board about the project put up at project site.
2	Use of OHS gadgets	Project staff using helmet and reflective jacket at work site.		Complied.
3	Notification on the use of OHS gadgets at project site.	Safety rules notification put at site to remind everyone.		Complied

4	Notification on the use of OHS gadgets at project site.	Safety rules notification put at site to remind everyone.		Complied.
5	OHS: Awareness campaign	Celebrated one week's National Safety week by the contractor in Project.		4-10 March 2018
6	Use of OHS gadgets	Labourers using helmets and reflective jackets at work.		Complied.
7	Materials stocking. (Autoclave Aerated Concrete blocks)	Neatly stacked.		Complied.





8	Signboard at site.	Signboard "Men at Work Drive Slow" erected.		Complied.
9	Construction of Office building.	80% complete.		Construction ongoing.
10	Construction of WWTP	Concrete slab casting. (foundation)		Ongoing.
11	Construction of WWTP	Concrete slab casting. (foundation)		Workers using vibrators for compaction.
12	Fire Fighting equipment.	A few equipment in palce		Complied.






13	First Aid Kit	Purchased and available in site office.		Complied.
14	First Aid Kit	Purchased and available in site office.		Basic medical equipment and medicine available in the First Aid Box.
15	First Aid Kit	Purchased and available in site office.		Resuscitation Face shield also available in the kit.
16	Emergency evacuation in case of natural disaster.	Everyone has been briefed and the assembly site identified in case of any emergency evacuation.		Assembly point identified and sign put up.






17	Materials stocking.	Pipes stacked at site.		
18	Water tanker.	Purchased for sprinkling water to suppress dust at construction site.		Operational.
19	Material stocking.	Sand and aggregates stocked.		Properly stocked at site.
20	Material stocking.	MS rods stacked at site.		






21	Material stocking.	Materials being transported at stock yard.		Sand being transported.
22	Material stocking.	Materials being stocked.		Sawn timber for construction works.
23	Concrete mixture plant.	Constructed and in operation.		
Component 2: Phuentsholing Thromde – Construction of 46.8m Bridge over Omchu river.				
24	Erection of sign boards.	Completed.		Sign board providing the Project information.






25	Erection of sign boards.	Completed.		
26	Erection of sign boards.	Completed.		
27	Erection of sign boards.	Completed.		
28	Erection of sign boards.	Completed.		

29	Procurement and use of OHS gadgets.	Completed.		Helmets worn during site visit. (DMSC Env. Consultant with contractor's Project Engineer)
30	Procurement and use of OHS gadgets.	Completed.		DMSC Dy. TL with contractor's Project Engineer.
31	Foundation works for bridge.	Ongoing		Works viewed from Left bank of Omchu river.
32	Foundation works for bridge.	Ongoing		Works viewed from Right bank of Omchu river.

33	Foundation works for bridge.	Ongoing		Close-up view.
34	Material Stocking.	Sand and aggregates.		Neatly stocked.
35	Material Stocking.	Aggregates.		Neatly stocked.
36	Toilet.	Constructed.		Labourers' toilet.
37	Camps	Constructed		Labour camps.

38	Camps	Constructed		Labour camps.
39	Toilet.	Constructed.		Staff toilet
40	Site Office	Constructed		Contractor'
41	Meeting	Progress and environmental safeguard issues.		DMSC consultants with Contractor's Project Engineer.
Component 3: S. Jongkhar Thromde_ Water Supply from Rikke chu				
42	Erection of sign boards.	Completed.		Overall project information.

43	Camps	Completed		With office and stores.
44	Toilet	Completed		Staff's & Labourers'.
45	Intake (Weir)	Completed		Fish-ladder included.
46	Material stocking	Sand and aggregates stocked at site.		Neatly stocked.
47	Office cum WTP complex	Construction ongoing.		Chemical building not constructed.

48	Office cum WTP complex	Construction ongoing.		Labourers using helmets on site.
49	Material stock.	Cement store.		Cement stacking.
50	Water supply: Laying of pipes.	Completed by August '17		Pipes laid till WTP only.
51	Office building.	Completed.		
52	Construction of 2.5 MLD water reservoir	Ongoing		80% complete

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**
Total Suspended Particulate matter			
24 Hour Average	500	200	100
Yearly Average	360	140	70
Respiratable Particulate matter (PM10)			
24 Hour Average	200	100	75
Yearly Average	120	60	50
Sulfur Dioxide			
24 Hour Average	120	80	30
Yearly Average	80	60	15
Nitrogen Oxides			
24 Hour Average	120	80	30
Yearly Average	80	60	15
Carbon Monoxide			
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 st Jan 2005	Vehicle registered after 01 st 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
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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, $\mu\text{S}/\text{cm}$	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.

V.List

- a) Noise, b) Air Pollution, c) Dust Control, e) Construction Waste, f) Pedestrian Safety, g) Traffic Safety, h) Contamination of Water Sources, i) Services Disruption, j) Mobility Access, k) Excess Material Disposal, l) Traffic Management Plan. M) GRM---Important, n) Integration of Transport, o) Slope Stabilization, p) IBET, q) EMP, r) Traffic Management*