

# Environmental Monitoring Report

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Final Report  
August 2021

## Bhutan: South Asia Subregional Economic Cooperation Road Connectivity Project

Northern Bypass Road I & II

Prepared by the Phuentsholing Thromde for the Government of Bhutan and the Asian Development Bank.

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FINAL ENVIRONMENT MONITORING REPORT, DATE 2021  
BHU SASEC Road Connectivity Project Northern Bypass Road I & II

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## **CURRENCY EQUIVALENTS**

(as of 30 April 2021)

Currency unit	–	Bhutanese Ngultrum
Nu. 1.00	=	\$ 0.0134
\$ 1.00	=	Nu. 74.2

## **ACRONYMS**

ADB	-	Asian Development Bank
BPCL	-	Bhutan Power Corporation Limited
CC	-	Construction Contractor
CSC	-	Construction Supervision Consultant
DFPS	-	Department of Forest & Park Services
EFRC	-	Environment Friendly Road Construction
EIA	-	Environment Impact Assessment
EMP	-	Environmental Management Plan
ES	-	Environmental Specialist
MDP	-	Mini Dry Port
NBR	-	Northern Bypass Road
NCD	-	Nature Conservation Division
NECS	-	National Environment Commission Secretariat
NRDCL	-	Natural Resource Development Corporation Limited
PMO	-	Project Management Office
PT	-	Phuentsholing Thromde
RGOB	-	Royal Government of Bhutan
ROW	-	Right of way

## **WEIGHTS AND MEASURES**

ha	-	Hectare
km	-	Kilometer
m	-	Meter

## **NOTES**

In this report, "\$" refers to US dollars

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## EXECUTIVE SUMMARY

1. The Royal Government of Bhutan (RGOB) and the Asian Development Bank approved the SASEC Road Connectivity Project (the Project) in July 2014. The project included the following components: (1) 68-km of National Highway between Nganglam and Dewathang; (2) 1.2 km access road from an Indian border constructed at Pasakha area; (3) A mini-dry port (MDP) in Phuentsholing and Alay land custom station; and (4) The construction of about 2.7km of a bypass road in Phuentsholing city, or the Northern Bypass Road (NBR).
2. Phuentsholing Thromde was one of the Executing Agencies of the Project, where it was in charge of implementing components 3 and 4 of the Project – the Mini Dry Port (MDP) in Phuentsholing and Alay land custom station; and the 2.7km Northern Bypass Road in Phuentsholing. Both components were implemented by the Phuentsholing Thromde (PT). The Project Management Unit (PMU) was supported by personnel from Phuentsholing Thromde, where they worked with supervision consultants to monitor all construction activities.
3. The Northern Bypass Road a 4-lane road starts at the second Indo-Bhutan gate, near the mini dry port and ends at the existing Phuentsholing–Thimphu road. The bypass road will decongest the traffic flow within the urban core of Phuentsholing.
4. The NBR I & II are categorized as B for the environment under ADB's SPS guidelines. Initial environmental examinations (IEEs) were prepared and disclosed on the ADB website in March 2014. The project administration manual (PAM) requires the submission of semi-annual environmental and social monitoring reports to ADB.
5. This is the final environmental monitoring report prepared for the Northern Bypass Road I & II. As of 12 March 2021, the overall progress of both Northern bypass I and II is 100%.
6. Environmental Clearances were obtained from the National Environment Commission Secretariat (NECS). The clearance for the bypass was obtained on 27 September 2017 (**Appendix 2**). With the extension of work due to the COVID-19 the Environment Clearance was renewed on 7 October 2020 (**Appendix 1**).
7. The environment management plan (EMP) for the project was monitored and implemented on day-to-day basis by the Environmental Focal Persons from both Contractor and Construction Supervision Consultant CSC (SI/ES).

## I. PROJECT DESCRIPTION

### A. NORTHERN BYPASS ROAD I & II (NBR)

#### 1. Project Scope

1. The Project included (i) earthworks to facilitate the replacement of existing roads and upgrading of the NBR carriageway and extended road base, and surfacing works (ii) construction of bridges and underpass (iii) construction, renewing and reconstructing culverts and drains serving the NBR road (iv) providing better crossing drain and better side drains and leadoff drainage facilities.

2. The project works required widening, reconstruction and construction of a new section of road and additional crossing over the Om Chhu River. The total road length was about 2.7km. The span of the bridge was 120m and the width was 19m. The works were adjacent to the existing road corridor for 2km, and additional 0.7 km of the alignment was newly constructed.

3. The scopes of work for the NBR connectivity project included the Contractor's details as provided in **Table 1**.

**Table 1: Work item, contractor's schedule, date of award and completion date**

SN	Work item	Name of Contractor	Contract award date/start date	Contract completion date
1.	Earthworks to facilitate the replacement of existing roads and upgrading of the NBR carriageway and extended road base, and surfacing works	M/s Marushin Shitaka – Rigsar Construction (J/V)	17/8 /2017 and 1/9/2017	NBR I: 27/01/2020
2.	Construction of bridges 120m length and 19m width.			NBR II: 12/03/2021
3.	Construction of culverts and drains serving the NBR alignment			
4.	Construction of underpass			
5.	Road widening works			
6.	Reconstruction and a new section of road			

Figure 1: Project Location of Phuentsholing Northern Bypass Road





## 2. Implementation Arrangement

4. The Phuentsholing Thromde (PT) under the Ministry of Works and Human Settlement (MOWHS) was the implementing agency and NBR was implemented through the Project Implementation Unit (PIU). Under the PIU there were three Project Implementation Units (PIUs) responsible for the day-to-day operation of the Northern Bypass Road Project.

5. The Project Manager (PM) from the PIU was the environmental focal person for the PT at the PIU level, who was responsible for ensuring the compliance of environmental management plan (EMP) requirements of the project. A Construction Supervision Consultant (CSC) supported the PIU in project implementation.

6. CSC included Team Leader (the Engineer), Bridge Engineer, Material Engineer, Quantity Surveyor, Environmental Specialist (ES), Resettlement & Social Specialist (RS), and Resident Engineer (RE) and Site Inspector (SI).

7. RE and SI were the main persons carrying out daily monitoring of construction works and ensuring that the implementation of environmental mitigation measures as prescribed in the EMP is being duly complied by the Construction Contractor (CC).

8. The contractor through its Project Manager/Site Engineer was responsible for ensuring EMP compliance, recording the quality of compliance and submission of the monthly EMP compliance report. Similarly, the RE submitted monthly project progress report which included a section on EMP compliance.

9. Environment Specialist (ES) of CSC carried out intermittent environmental compliance monitoring of the project to ensure that the environmental mitigation measures or EMP requirements were adequately addressed. ES was responsible for compiling and submitting the annual environmental monitoring report to the PT through PIU. PIU submitted the report to ADB.

10. A District Environmental Committee (DEC) has been formed consisting of Dzongkhag planning officer, forest officer, land record officer, agriculture officer, environmental officer, and Engineer. The District Environmental Officer (DEO) were district officials of NECS.

11. DEC was responsible for issuing Environmental Clearance to the projects mandated to the committee and for periodically checking environmental compliance by the projects to which it issued the environmental clearance. As part of its regular activities, NECS gave general training and orientation to DEOs before sending them to the districts. These orientations focused mainly on Bhutan's environmental requirements.

## 3. Project Implementation Progress

12. The progress of work as of 1 April 2021 are presented in the following **Table 2**.

**Table 2: Work Progress**

Item No.	Activities	% Completed	Remarks
1	Camp and site office establishment	100%	Project work completed.
2	Setting up of concrete batching plant	100%	
3	Road work	100%	
4	Construction of boundary wall	100%	



Item No.	Activities	% Completed	Remarks
5	Construction of Sewerage and Drainage system	100%	
6	Construction of Road Network (flexible)	100%	
7	Underpass	100%	
8	Construction of bridge	100%	
9	Earthwork	100%	
10	Sub-Base work	100%	
<b>Overall project completion</b>		100%	

#### 4. Construction Approach and Methodology

13. NBR construction was carried out in an environmentally friendly manner following the principles of balanced cut and fill. Excess excavated materials were disposed in the pre-identified spoil disposal sites at Toorsa Riverside, which was duly approved by Phuentsholing Thromde. The identified place currently falls under the PTDP project area and the materials disposed was used by the project for backfilling.

#### 5. Project Cost / Implementation Schedule

14. The total quoted cost for NBR was Nu.458.973 million (NBR I Nu.214.992 & NBR II Nu. 243.981). The project NBR-I started on 1 September 2017 and completed on 27 January 2020. The NBR II commenced on 1 September 2017 and completed on 12 March 2021. **No separate amount was allocated in the contract document for implementing environmental management works in both the Package NBR-I & II.**

#### 6. Project Categorization

15. The Project was classified as category B following ADB's Safeguard Policy Statement (2009).

### I. SAFEGUARDS COMPLIANCE

#### A. Compliance to Financing Agreement (Special Operations)

16. The environmental safeguard requirements were indicated in the Financing Agreement (Grant Number 0400-BHU) between ADB and the Kingdom of Bhutan dated 5 September 2014. The provisions of financing agreement and their compliance status is presented in the following **Table 3.**

**Table 3: Status of Compliance to Environmental Provisions of the Financing Agreement**

S.N	Environment Provision	Compliance Status
		Northern Bypass Road I & II
1	<p><b>Schedule 4. Item 6(a):</b>  <u>Conditions for awards of contracts</u></p> <p>6. The Beneficiary shall ensure that no Works contract which involves environmental impacts is awarded until:</p>	<p>Complied. The EC was accorded as per IEE on 27/9/2017 while the civil works contract commenced on 1/9/2017.</p>

S.N	Environment Provision	Compliance Status
		Northern Bypass Road I & II
	<p>(a) The relevant environmental authority of the Beneficiary has granted the final approval of the EIA and/or IEE; and</p> <p>The Beneficiary has incorporated the relevant provisions from the EMP into the Works contract.</p>	Complied. The EMP prepared and submitted by the Contractor was approved for implementation and was monitored from time to time.
2	<p><b>Schedule 5. Item 2:</b></p> <p><u>Counterpart Funds</u></p> <p>2. The Beneficiary shall make available the Loan and Grant proceeds to the Project Executing Agencies under appropriate arrangements acceptable to ADB, and shall provide or cause each Project Executing Agency to provide, as necessary, respective counterpart staff, land, facilities, and funding required for timely and effective implementation of the Project, including, without limitation, any funds required (a) to meet any shortfall between cost and revenues for the O&amp;M of Project facilities; (b) to mitigate unforeseen environmental or social impacts; and (c) to meet any additional costs arising from design changes, price escalation in construction costs and/or unforeseen circumstances. The Beneficiary shall cause the relevant Project Executing Agency to make the resources thus required available on an annual basis for each fiscal year.</p>	<p>Complied.</p> <p>The counterpart funding from the RGOB was being disbursed timely for compensation to the affected parties. The Project Coordinator and Project Manager were appointed as counterpart staff to the project</p>
3	<p><b>Schedule 5. Item 5:</b></p> <p><u>Environment</u></p> <p>5. The Beneficiary shall ensure, or cause the relevant Project Executing Agency to ensure, that the preparation, design, construction, implementation, operation and decommissioning of the Project and all Project facilities comply with (a) all applicable laws and regulations of the Beneficiary relating to the environment, health and safety; (b) the Environmental Safeguards; and (c) all measures and requirements outlined in the EIA, the IEE, the EMP, and any corrective or preventative actions outlined in a Safeguards Monitoring Report.</p>	<p>Complied.</p> <p>The compliance requirements concerning social and environmental safeguards, health and safety and EMP satisfactorily complied.</p>
4	<p><b>Schedule 5. Item 9:</b></p>	<p>Complied.</p> <p>The Project Manager and the Project Engineer from PT monitored the site from time to time.</p>

S.N	Environment Provision	Compliance Status
		Northern Bypass Road I & II
	<p><u>Human and Financial Resources to Implement Safeguards</u></p> <p><u>Requirements</u></p> <p>9. The Beneficiary shall make available, or cause the Project Executing Agencies to make available, necessary budgetary and human resources to fully implement the EMP and the RP.</p>	
5	<p><b>Schedule 5. Item 10:</b></p> <p><u>Safeguards – Related Provisions in Bidding Documents and Works Contracts</u></p> <p>10. The Beneficiary shall ensure, or cause the Project Executing Agencies to ensure, that all bidding documents and contracts for Works contain provisions that require contractors to:</p> <p>(a) Comply with the measures relevant to the contractor outlined in the EIA, the IEE, the EMP, the RP and any indigenous peoples plan (to the extent they concern impacts on affected people during design and/or construction), and any corrective or preventative actions outlined in a Safeguards Monitoring Report;</p> <p>(b) Make available a budget for all such environmental and social measures;</p> <p>(c) Provide the Project Executing Agency with written notice of any unanticipated environmental, resettlement or indigenous peoples risks or impacts that arise during design, construction, implementation or operation of the Project that was not considered in the EIA, the IEE, the EMP, and the RP;</p> <p>(d) Adequately record the condition of roads, agricultural land and other infrastructure before starting to transport materials and construction; and Reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition upon the completion of construction.</p>	<p>Not applicable. No indigenous people were located within project premises.</p> <p>Complied. The required funds for environmental and social measures were disbursed on a need basis. Impacts to Environmental, resettlement or indigenous peoples was not anticipated.</p> <p>No effect on road and agricultural land.</p>
6	<p><b>Schedule 5. Item 11:</b></p> <p><u>Safeguards Monitoring and Reporting</u></p>	<p>The final environmental monitoring report is prepared to comply with the clause.</p> <p>N/A (no unanticipated risks were experienced)</p>

S.N	Environment Provision	Compliance Status
		Northern Bypass Road I & II
	<p>11. The Beneficiary shall do the following or cause the Project Executing Agencies to do the following:</p> <p>a.) Submit annual Safeguards Monitoring Reports to ADB for disclosure on ADB's website and disclose relevant information from such reports to affected persons promptly when requested;</p> <p>b.) If any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that was not considered in the EIA, the IEE, the EMP, and the RP, promptly inform ADB of the occurrence of such risks or impacts, with a detailed description of the event and proposed corrective action plan;</p> <p>c.) No later than 3 months from the award of the first Works contract, engage or cause to be engaged qualified and experienced external experts or qualified non-governmental organizations under a selection process and terms of reference acceptable to ADB, to verify information produced through the Project monitoring process for environment, resettlement and indigenous peoples (if any), and facilitate the carrying out of any verification activities by such external experts; and</p> <p>d.) Report any actual or potential breach of compliance with the measures and requirements outlined in the EMP and the RP promptly after becoming aware of the breach.</p>	<p>N/A (no major environmental or social issues were anticipated in the project that warranted engagement of an external expert)</p> <p>N/A (No breach in compliance)</p>

## B. Compliance to Project Administration Manual

17. The Project Administration Manual<sup>1</sup> (PAM) described how the Phuentsholing Thromde, Department of Roads, and Ministry of Works and Human Settlements implemented the project and delivered the results on time, with quality, within budget, and under the government and Asian Development Bank (ADB) policies and procedures.

18. The PAM was mandatory and served as the main document describing implementation details. The status of implemented environmental safeguards requirements set out in PAM is provided in **Table 4**.

**Table 4: Status of Compliance to Environmental Provisions in the PAM**

SN	Environmental Provision	Compliance Status
		Northern Bypass Road I & II
1	<p><b>Schedule VIII. Item 31:</b> <b><u>Categorization</u></b></p> <p>31. The subprojects Northern Bypass Road (NBR) and Phuentsholing Mini Dry Port (MDP) are category B. Initial Environment Examination (IEE) reports have been prepared for Northern Bypass Road (NBR) and Phuentsholing Mini Dry Port (MDP).</p>	100 % complied
2	<p><b>Schedule VIII. Item 32:</b> <b><u>Implementation of Environmental Management Plan (EMP)</u></b></p> <p>32. PT will ensure that all environment safeguard requirements under the project will be implemented as required by the IEEs for NBR and MDP. An EMP has also been prepared for the NBR and MDP. The EMP matrix from the final IEE reports will be attached to the bidding documents. The contractors will be required to include the costs for implementing the environmental clauses and EMP in their bids.</p>	Complied as per detailed design.
3	<p><b>Schedule VIII. Item 33:</b></p> <p>33. The EMP is a plan for the implementation and monitoring of environmental mitigation and enhancement measures during project construction and operation. Specific measures with details on the location, time and responsible agency for implementation and monitoring is given in the EMP. Mitigation measures for implementation during the construction stage is implemented by the contractor and during the operation stage by PT through PIU. The Environmental Specialist in the consulting services for both the PT subprojects will support PT to guide and monitor the implementation of EMPs by contractors. An Environmental Focal Person (EFP) will be appointed under PT. Similarly, an EFP will be appointed at the site level under the consulting services for conducting day to day monitoring of EMP implementation. An EFP will also be appointed by the contractor for each contract package to ensure proper implementation of the EMP.</p>	Complied. Environmental Focal Person (EFP) was appointed by Consultant and the Contractor
4	<p><b>Schedule VIII. Item 34:</b></p> <p>34. The EMP includes the collection of baseline data on air and noise quality during the pre-construction stage. The Environmental Specialist in the consulting services will be</p>	Complied. The air and noise monitoring equipment was procured and air and noise monitoring was conducted every few months.

SN	Environmental Provision	Compliance Status
		Northern Bypass Road I & II
	responsible for procuring the monitoring equipment and organizing training on the operation of the equipment by the supplier for the EFP under the PIUs, consulting services and contractors before the start of construction works. The Environmental Specialist in the consulting services will be responsible for the baseline data collection on air, noise, and water quality before construction works begin, during construction and early stages of operation as given in the EMP. After the construction works are over, the monitoring equipment will be handed over to PT for use by the EFP for other projects. An initial coordination cum training workshop will be organized by PT with technical support from consulting services and ADB as necessary.	
5	<b>Schedule VIII. Item 35:</b> 35. All required clearances such as the environmental clearance and forestry clearance must be obtained by the PIUs before the start of construction works for all project components.	Complied. All the necessary environmental clearance and forest permits were obtained by PMU before starting construction works.
6	<b>Schedule VIII. Item 43:</b> <b><u>Grievance Redress Mechanism</u></b> 43. A grievance redress mechanism will be established to receive and facilitate the resolution of concerns, complaints and grievances of affected people and relevant agencies on the social and environmental performance of the project in a time-bound and transparent manner. The project-specific GRM is not intended to bypass the government's redress process, rather it is intended to address project-affected people's concerns and complaints promptly, making it readily accessible to all segments of affected persons and is scaled to the risks and impacts of the project.	GRM was established. Project affected people could approach PMU and the Dzongkhag Land Committee.
7	<b>Schedule VIII. Item 44:</b> <b><u>Monitoring and Reporting</u></b> 44. Implementation of the EMP will be monitored by PIUs with the support of consulting services. For environment safeguards, records on implementation of the mitigation measures on-site will be maintained by the contractor. Based on these records and spot checks of at least once a month by PIUs and consultants, monitoring reports will be compiled by the Environmental Specialists in	Complied. The reporting system was followed by the contractor and the process were followed for compiling the environmental monitoring report.

SN	Environmental Provision	Compliance Status
		Northern Bypass Road I & II
	consulting services on a semi-annual basis. If there are any changes in the design or alignment, the EMP and RP of the respective subproject will be updated to account for any additional or new impacts. Further, the need for revising the IEE reports will also be reviewed and confirmed in discussion with ADB	

### C. Compliance with the Civil Works Contract Agreement

**Table 5: Status of Compliance to Environmental Provisions of the Civil Works Contract Agreement**

SN	Description	Compliance Status
		Northern Bypass Road I & II
1	Orientation for Contractors, Workers on environmental and social management	Orientation for contractor and worker on the environment was conducted. 100% compliance has been achieved.
2	Loss of vegetation	216 trees for NBR I and 68 trees for NBR II were cut down and handed over to NRDCL.
3	Drainage and Hydrological Impacts	Complied
4	Procurement and storage materials	Complied
5	Solid waste management	Complied
6	Noise and Dust pollution	Complied
7	Excavation and disposal	N/A

## II. COMPLIANCE TO ENVIRONMENTAL MANAGEMENT PLAN

19. The environmental management plan (EMP) for Northern Bypass Road I & II are presented in **Table 6, 7 & 8**.



**Table 6: Status of Compliance to Environmental Provisions of the Environmental Management Plan – Northern Bypass I**

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non-Compliance
1.	Tree Felling or Site Clearance	<ul style="list-style-type: none"> <li>Tree felling was done with approval from the Department of forest.</li> <li>Tree felling with the procedure set in Forest and Nature Conservation Rules (2006) with necessary trees marked by the DOF.</li> <li>Economically valuable timber will have to be handed over to NRDCL.</li> <li>Compensatory Plantation depending on the availability of vacant or barren Government Land.</li> </ul>	<ul style="list-style-type: none"> <li>Approximately 216 trees were marked and felled along the NBR-01.</li> <li>Tree felling was done with approval from the Department of Forest.</li> <li>All timber was handed over to NRDCL.</li> <li>No compensatory Plantation done as per contract provision, and the nature of the project.</li> </ul>	NBR-01	Complied
2	Baseline Environment data (Air and Noise)	<ul style="list-style-type: none"> <li>As part of institutionalization and capacity building for environmental compliance monitoring and reporting, ADB will finance the procurement of environmental monitoring equipment and provide the necessary training.</li> <li>Baseline data on air quality and noise levels of all sensitive area (commercial, residential and institutional) will be assessed before the commencement of civil works. These data will help in assessing project impacts during implementation.</li> </ul>	<ul style="list-style-type: none"> <li>Environmental monitoring equipment of Mini Dry Port Project was used. Baseline environment data (Air and noise) was monitored throughout the project construction phase.</li> </ul>	NBR-01	Complied
3	Safety Precautions for the workers.	<ul style="list-style-type: none"> <li>Worker's occupational health and safety will be generally governed by the Labour and Employment Act of Bhutan 2007. Construction works will generally result in accidents and injuries or even the demise of the workers if no health and safety measures are followed.</li> <li>Mitigation measures implemented by contractors to ensure the health and safety of workers are as follows:</li> <li>The contractor will instruct workers in health and safety matters as required by law and</li> </ul>	<ul style="list-style-type: none"> <li>A required health and safety measure was followed as per the Labour and Employment Act of Bhutan 2007</li> <li>Workers were instructed on health and safety matters required.</li> <li>Deep excavation was barricaded with</li> </ul>	NBR-01	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non- Compliance
		<p>by good engineering practice and provide first aid facilities.</p> <ul style="list-style-type: none"> <li>The contractors will instruct and induct all workers in health and safety matters (induction course) including construction camp rules and site agents/foremen will follow up with toolbox talks weekly. Workforce training for all workers starting onsite will include safety and environmental hygiene.</li> <li>Fencing on all areas of excavation greater than 1m deep and sides of temporary works shall be observed.</li> <li>Workers shall be provided with appropriate personnel safety equipment such as safety boots, helmets, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers.</li> <li>The contractor will at all-time keep the first aid kit at the construction sites.</li> <li>The contractor will be responsible for evacuating the injured person to the nearest medical center and bear all the medical expenses.</li> </ul>	<p>information and safety signboards.</p> <ul style="list-style-type: none"> <li>All workers were provided basic safety pieces of equipment like Helmets, boots, gloves, dust masks etc.</li> <li>First Aid Kit was kept at the construction site.</li> <li>Necessary arrangement for evacuation of the injured person to the nearest medical center was arranged.</li> </ul>		
4	Public safety	<ul style="list-style-type: none"> <li>Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points.</li> <li>The general public/local residents shall not be allowed in high-risk areas e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep the public out.</li> <li>Speed restrictions shall be imposed on Project vehicles and equipment when travelling within 50 m of sensitive receptors (e.g. residential, schools, temples, etc</li> </ul>	<ul style="list-style-type: none"> <li>Necessary barricading of the construction site and use of green nets on the barricaded portions were arranged.</li> <li>Caution information board at the construction site for public awareness were erected.</li> </ul>	NBR-01	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non- Compliance
5	General Construction Waste Management	<ul style="list-style-type: none"> <li>Contractor will try to minimize waste at the source.</li> <li>Waste products will be segregated, recycled and reused whenever possible.</li> <li>Recyclable waste will be sold to the scrap dealers.</li> <li>Organic waste such as plant materials will be composted.</li> <li>Residual non-hazardous waste will be disposed of in the municipal landfill.</li> <li>Construction/workers' camps will be provided with sufficient refuse bins.</li> <li>Burning of construction and domestic wastes will be prohibited.</li> <li>Disposal of solid wastes into floodways, wetland, rivers, other watercourses, farmland, forest and associated places of worship or other culturally sensitive areas or areas where a livelihood is derived from canals, agricultural fields and public areas will be prohibited.</li> </ul>	<ul style="list-style-type: none"> <li>Minimized wastage at the source.</li> <li>Re-use of wastage was maintained.</li> <li>Reuse bins were kept at appropriate locations.</li> <li>Burning of construction wastes was strictly prohibited.</li> <li>Proper disposal of wastage with approval from concerned authority.</li> </ul>	NBR-01	Complied
6	Use of hazardous substances and hazardous waste disposal	<ul style="list-style-type: none"> <li>Hazardous substances including oil and lubricants will be disposed of correctly.</li> <li>Hazardous substance disposed of will not be directly disposed of in the surrounding environment and downstream water body.</li> <li>Mitigation measures will seek to control access to and the use of hazardous substances such as oils and lubricants and control waste disposal.</li> <li>Contractor will carry out the following measures to minimize the impacts: <ul style="list-style-type: none"> <li>Oil and lubricants will be safely stored. Secondary containment around the fuel storage area will be ensured.</li> <li>Use of hazardous substances including oil and lubricants can cause significant</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Fuel was filled directly from fuel pumps.</li> <li>Oil, Lubricants were stored with proper management.</li> <li>Strict prohibition on disposal of hazardous substances into open areas and water body.</li> <li>Hazardous materials were stored away from water bodies.</li> </ul>	NBR-01	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non- Compliance
		<p>impacts if uncontrolled or if waste is not disposed of correctly.</p> <ul style="list-style-type: none"> <li>Hazardous substance disposed of into open area and drainage system will directly harm surrounding environment and downstream water body.</li> <li>Mitigation measures will seek to control access to and the use of hazardous substances such as oils and lubricants and control waste disposal.</li> <li>Contractor will carry out the following measures to minimize the impacts:</li> </ul>			
7	Drainage and Hydrological Impacts	<ul style="list-style-type: none"> <li>Contractor will ensure the proper disposal of spoil and other waste.</li> <li>Hazardous waste such as oil and lubricants will be properly stored and sent for recycling.</li> <li>Solid municipal waste will be disposed of in a municipal landfill.</li> </ul>	<ul style="list-style-type: none"> <li>Proper disposal of spoil and other waste was maintained.</li> </ul>	NBR-01	Complied
8	Traffic Management	<ul style="list-style-type: none"> <li>In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to project operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold-ups and congestion.</li> <li>In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up.</li> <li>Provide safe vehicle and pedestrian access around construction areas.</li> <li>Install bold diversion signs that would be visible even at night and provide a flag.</li> </ul>	<ul style="list-style-type: none"> <li>Proper traffic diversion and management was maintained with informatively and appropriate signboards.</li> <li>Safety barricades and caution signals were provided within construction areas.</li> <li>Safe Vehicle and pedestrian access bypassing the construction areas were maintained.</li> </ul>	NBR-01	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non- Compliance
		<ul style="list-style-type: none"> <li>Persons to warn of dangerous conditions (24 hours, as necessary)</li> <li>Provide sufficient lighting at night within and in the vicinity of construction sites.</li> </ul>			
9	Sanitation and Diseases	<ul style="list-style-type: none"> <li>Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent the proliferation of mosquitoes.</li> <li>Temporary and permanent drainage facilities have been designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds.</li> <li>Malaria controls (e.g., provision of insecticide-treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the project.</li> <li>HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the Project.</li> </ul>	<ul style="list-style-type: none"> <li>Proper flow of existing drainage was maintained.</li> </ul>	NBR-01	Complied
10	Asphalt Plant, rock crushers, bitumen usage and soil contamination	<ul style="list-style-type: none"> <li>Locate asphalt plant and rock crushers (wherever practical) at least 500m from nearest sensitive receivers (residential areas, schools, hospital, etc.) and rivers and install and maintain dust suppression equipment.</li> <li>Bitumen Drums stored in a dedicated area not scattered along Project Roads and other project facilities.</li> <li>Bitumen will not be allowed to enter the drainages system.</li> <li>Bitumen storage and mixing areas shall be protected against spillage.</li> <li>All accidental spills of bitumen or chemicals should be cleaned up immediately with the top 2cm of any contaminated soil</li> </ul>	<ul style="list-style-type: none"> <li>Asphalt plant was installed at the bank of Toorsa river, away from river and settlements.</li> <li>Mitigation measures were implemented.</li> </ul>	NBR-01	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non-Compliance
		underneath and disposed of as chemical waste to a site approved by the local authority.			
11	Noise and dust nuisances	<ul style="list-style-type: none"> <li>• Water sprinkling or spraying using a tanker done twice a day to reduce dust generation.</li> <li>• Water can be sourced from the Amochhu River</li> <li>• Fuel-efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out.</li> <li>• Vehicles transporting soil, sand and other construction materials will be covered with tarpaulin sheets to reduce the release of dust and avoid impacts from dust.</li> <li>• Speed limits of such vehicles within the works site and on unpaved edge areas of the Project road will be established and agreed upon with the PMU.</li> <li>• Noise and dust monitoring has been carried out.</li> <li>• Working hours should be restricted from 8 am to 5 pm to avoid disturbances to nearby residents during the night.</li> </ul>	<ul style="list-style-type: none"> <li>• Water sprinkling on the roads around construction sites was maintained for dust control.</li> <li>• Periodic maintenance and emission check from the concerned authority were maintained.</li> <li>• Proper cover was provided during transportation of construction materials</li> <li>• Drivers were strictly informed of the speed limit.</li> <li>• Limit on working hours was monitored</li> </ul>	NBR-01	Complied
12	Construction equipment's, machinery and vehicles	<ul style="list-style-type: none"> <li>• Regular maintenance of all machinery, pieces of equipment and vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>• Regular maintenance and check-up of the vehicle were maintained.</li> </ul>	NBR-01	Complied
13	Identification of disposal sites for construction debris	<ul style="list-style-type: none"> <li>• Identify suitably located disposal sites for construction debris</li> </ul>	<ul style="list-style-type: none"> <li>• Disposal of construction debris was disposed of at the specific disposal site.</li> </ul>	NBR-01	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non-Compliance
14	Closure of equipment yards and camps	<ul style="list-style-type: none"> <li>Removable of structures, clean up construction camp debris and backfill latrines; grade, re-vegetate the area and tree planting under the compensatory forest program.</li> </ul>	<ul style="list-style-type: none"> <li>No compensatory Plantation was done as per contract provision, and the nature of the project. The Phuentsholing thromde will be planting plants along with the dividers and in the roundabout.</li> </ul>	NBR-01	Complied
15	Operation of equipment storage and repair yards, and fuel depots	<ul style="list-style-type: none"> <li>Prevent oil and fuel spills, control runoff from contaminated areas.</li> </ul>	<ul style="list-style-type: none"> <li>Cleanliness was maintained at the equipment yard /repair yard.</li> </ul>	NBR-01	Complied
16	Management of Workers	<ul style="list-style-type: none"> <li>Prohibit fishing, hunting and gathering of firewood among workers.</li> <li>Provide construction camps with food supplies from purchased stores.</li> </ul>	<ul style="list-style-type: none"> <li>Workers were informed of prohibition from fishing, hunting and gathering illegal firewood.</li> <li>Workers were provided with camps and required equipment and food supplies.</li> </ul>	NBR-01	Complied
17	Set up of construction camps	<ul style="list-style-type: none"> <li>Camp facilities should be located at a distance from nearby communities.</li> <li>Provide sanitary facilities (dry pit or pour-flush latrines) for workers and arrange for disposal of solid waste per local practice</li> </ul>	<ul style="list-style-type: none"> <li>Labor Camps were established away from community settlement.</li> <li>Sanitary latrines with septic tank were provided at labour camps.</li> <li>Proper drinking water facility was provided.</li> </ul>	NBR-01	Complied



S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non-Compliance
			<ul style="list-style-type: none"> <li>Disposal pits with sufficient re-use bins were provided.</li> </ul>		
18	Operation of construction camps	<ul style="list-style-type: none"> <li>Workers hired by contractors should be screened in advance for HIV/AIDS.</li> <li>HIV/AIDS awareness-raising campaign must be conducted as per the social plan of the project.</li> </ul>	<ul style="list-style-type: none"> <li>Workers were only recruited after the medical check-up.</li> <li>STD/HIV/AIDS awareness campaign was conducted at the MDP site on November 17, 2017.</li> </ul>	NBR-01	Complied

**Table 7: Status of Compliance to Environmental Provisions of the Environmental Management Plan – Northern Bypass II**

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non-Compliance
<b>PRE-CONSTRUCTION</b>					
1	Design Measures	<ul style="list-style-type: none"> <li>IEE for NBR submitted to NEC and environmental clearance was approved.</li> <li>Public clearance from Phuentsholing Thromde was obtained.</li> <li>IEE recommendations have been incorporated into the design.</li> <li>Unnecessary stockpiling of rock and bitumen-based materials near the road is avoided.</li> <li>Water and power supply is provided from a different source from the community</li> </ul>	<p>Yes. Environmental clearance for NBR received.</p> <p>See Appendix 2 (Environmental Clearance of Northern Bypass Road)</p>	NBR II	Complied
2	Environmentally responsible procurement of equipments to test pollution	<ul style="list-style-type: none"> <li>Contractor engineer is trained at the site on day to day basis</li> <li>Procured air and noise monitoring equipment</li> </ul>	<p>Yes. The equipment of MDP was used for air and noise monitoring.</p>	NBR II	High dust pollution in certain locations along with the NBR sites due to heavy movement of other

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non Compliance
					commercial heavy vehicles.
3	Environmental capacity development	<ul style="list-style-type: none"> <li>Required training on data collection and assessment for Environment baseline (air and noise) monitoring equipment was conducted.</li> <li>Health awareness campaign on STD/HIV/AIDS has been conducted at contractor's camp area</li> </ul>	<p>.</p> <p>Yes.</p> <p>STD/HIV/AIDS awareness campaign was conducted at the MDP site on November 17, 2017. 50 labourers and 10 site engineers were present during the campaign.</p>	NBR II	Complied
4	Protect and re-provision irrigation and utilities	<ul style="list-style-type: none"> <li>Power, water supply, telecommunications being monitored in consultation with PT, BPC &amp; BT and irrigation systems are not interrupted by project work till now.</li> </ul>	Yes	NBR II	Complied
5	Tree Cutting	<ul style="list-style-type: none"> <li>68 trees felled only in required areas with approval from the Department of Forestry.</li> </ul>	Yes	NBR II	Complied

SN	Activity	Mitigation Measures	Compliance attained (Yes, No. Partial)	NBR II	Comment/Reasons for Partial or Non- Compliance
<b>CONSTRUCTION</b>					
1	Orientation for Contractors, Workers on environmental and social management	<ul style="list-style-type: none"> <li>We oriented our contractor during the monthly meeting and workers at the construction site. Awareness campaign has been conducted at the camp area on health issues.</li> </ul>	Yes	NBR II	Complied
2	Loss of vegetation and impacts to fauna	<ul style="list-style-type: none"> <li>Impact on vegetation and fauna is very minimal.</li> </ul>	Yes	NBR II	Complied

<b>S.N</b>	<b>Activity</b>	<b>Mitigation Measures</b>	<b>Compliance attained (Yes, No, Partial)</b>	<b>Location</b>	<b>Comment/Reasons for Partial or Non Compliance</b>
3	Drainage and Hydrological Impacts	<ul style="list-style-type: none"> <li>• Provided adequate drainage at construction sites and camps to avoid pounding and flooding</li> </ul>	Yes	NBR II	Complied
4	Materials exploitation and management of quarry and borrow areas	<ul style="list-style-type: none"> <li>• Not required as construction materials are being transported from approved private mines</li> </ul>	No	NBR II	Not required as the mines/quarry were managed by a private individual
5	Spoil Disposal	<ul style="list-style-type: none"> <li>• Spoils are dumped at identified dumping area near Toorsa River.</li> <li>• Contractor follows balanced cut and fill.</li> </ul>	Yes	NBR II	Complied
6	General Construction Waste Disposal	<ul style="list-style-type: none"> <li>• Contractor has made two pits for organic waste &amp; non-organic waste, with sufficient refuse bins within site camps and offices.</li> </ul>	Yes	NBR II	Complied
7	Use of hazardous substances and hazardous waste disposal	<ul style="list-style-type: none"> <li>• No hazardous substances and waste are generated at the construction site</li> <li>• Contractor maintains their machines and vehicles in Phuentsholing workshops</li> <li>• Project vehicles are fuelled from the Phuentsholing fuelling station.</li> </ul>	Yes	NBR II	Complied
8	Asphalt plant rock crushers, bitumen usage and soil contamination	<ul style="list-style-type: none"> <li>• Asphalt plant is at the site, but strict mitigation measures are being implemented. No rock crushers at the site. They will source from a private firm. Therefore, there would not be soil contamination</li> </ul>	Yes	NBR II	Complied
9	Noise and dust nuisances	<ul style="list-style-type: none"> <li>• Construction site is near human settlement, but noise is monitored throughout the day, to make sure no complaints are filed. No overtime work is encouraged, as the noise from the site will impact the people.</li> <li>• Project vehicles are maintained on time.</li> <li>• Water tanker is being deployed by the contractor to subside the dust along the road within the project area.</li> <li>• Air and noise have been monitored by CSC.</li> </ul>	Yes	NBR II	Complied

<b>S.N</b>	<b>Activity</b>	<b>Mitigation Measures</b>	<b>Compliance attained (Yes, No, Partial)</b>	<b>Location</b>	<b>Comment/Reasons for Partial or Non Compliance</b>
10	Blasting (if required)	<ul style="list-style-type: none"> <li>Controlled blasting</li> </ul>	Yes	NBR II	Complied
11	Erosion control / run-off	<ul style="list-style-type: none"> <li>Temporary drainage has been constructed</li> </ul>	Yes	NBR II	Complied
12	Water quality	<ul style="list-style-type: none"> <li>Camps and site office are located away from the river.</li> <li>No solid waste from construction is thrown in the river.</li> <li>Washing of machinery and vehicles in the river is strictly prohibited within project premises</li> </ul>	Yes	NBR II	Complied. Camps were away from river although in the floodplain
13	Water Resources	<ul style="list-style-type: none"> <li>Water has been sourced from a different source within the community</li> <li>Camps are located away from the water source</li> <li>Contractor transports water by water tanker</li> </ul>	Yes	NBR II	Complied
14	Operation of workers camps	<ul style="list-style-type: none"> <li>Worker camps and facilities are located away from settlements and river</li> <li>Toilets &amp; bathrooms with continuous water supply &amp; electricity are made available</li> </ul>	Yes	NBR II	Complied
15	Sanitation and diseases	<ul style="list-style-type: none"> <li>Temporary drainage has been constructed</li> <li>Health awareness campaign conducted by the Health official from Consultancy as per the social plan at the worksite to the labours</li> </ul>	Yes	NBR II	Complied
16	Safety precautions for the workers	<ul style="list-style-type: none"> <li>Safety helmet, gumboots, safety gloves and safety jackets are provided to labourers at site &amp; made sure they use them all the time at the site</li> <li>First Aid Kit box is made available at the construction site</li> </ul>	Yes	NBR II	Complied
17	Public Safety	<ul style="list-style-type: none"> <li>Excavated area has been barricaded with information and safety signboards</li> <li>Caution information board &amp; Cautionary Plastic Ribbon along footpath &amp; roadside as</li> </ul>	Yes	NBR II	Complied

S.N	Activity	Mitigation Measures	Compliance attained (Yes, No, Partial)	Location	Comment/Reasons for Partial or Non Compliance
		Temporary measures for public awareness has been maintained			
18	Traffic Conditions	<ul style="list-style-type: none"> <li>Safety barricades and caution signals provided within construction areas.</li> <li>Proper traffic diversion and management has been maintained with informatively and appropriate signboards to control the traffic</li> <li>Provided with sufficient lighting at night within and in the vicinity of construction sites</li> </ul>	Yes	NBR II	Complied
19	Archaeological and cultural artefacts	<ul style="list-style-type: none"> <li>No historical, Cultural and Religious artefacts found along NBR-2 premises</li> </ul>	N/A	NBR II	Complied
20	Compensatory Plantation	<ul style="list-style-type: none"> <li>Not yet</li> </ul>	N/A	NBR II	Complied

**Table 8: Status of Compliance to Environmental Provisions of the Environmental Management Plan – Northern Bypass I & II**  
**Site Specific**

SN	Activities at the Construction site.	Impacts	Mitigation Measures	Mitigation Measures Implemented	Remarks	Deficiencies/ Remarks/ Observations (To be completed by CSC)
1.	Rural Electricity Supply Pole and Lines	Power Supply	<ul style="list-style-type: none"> <li>Avoid dumping spoil towards electric pole location</li> <li>If damages are unavoidable, then the poles have to be relocated to a safer place in coordination with BPCL with prior information to the affected people</li> </ul>	<ul style="list-style-type: none"> <li>41 electric poles (falling inside ROW) have been dismantled and handed over to concerned authorities. Most of them were street lights, which will be reinstated soon as per the design. Other electric poles carrying power supply to communities have been relocated to a safer place.</li> <li>Underground power supply cables were damaged at some locations during road and drain</li> </ul>	41 electricity poles were relocated.	Complied

SN	Activities at the Construction site.	Impacts	Mitigation Measures	Mitigation Measures Implemented	Remarks	Deficiencies/ Remarks/ Observations (To be completed by CSC)
				excavation which has been reinstated immediately.		
2.	Telecommunication poles	Public Communication	<ul style="list-style-type: none"> <li>Avoid dumping spoil towards telephone poles location</li> <li>If damages are unavoidable, then the poles have to be relocated to a safer place in coordination with Telecom with prior information to the affected people.</li> </ul>	<ul style="list-style-type: none"> <li>1 telecommunication pole (falling inside ROW has been dismantled and handed over to concerned authorities. The pole was relocated to a safer place.</li> <li>Underground telecommunication cables were damaged at some locations during road and drain excavation which has been reinstated immediately.</li> </ul>	Around 10 poles fell within the right of way of the project road, which were relocated.	Complied
3.	Footpath	Accident	<ul style="list-style-type: none"> <li>316 meters of footpath will be dismantled since the project road alignment falls on the existing footpath.</li> </ul>	<ul style="list-style-type: none"> <li>Most of the walkway in the embankment have been damaged which was inevitable for the construction of the roadside drain. Temporary footpaths have been managed till the reconstruction of a new footpath over the drain is compelled.</li> </ul>	Project restored the footpath during the Construction phase.	Complied
4.	Crocodile zoo	Relocation	<ul style="list-style-type: none"> <li>Two different species 8 mugger crocodile &amp; 15 small Juvenile crocodiles, in total there are 23 crocodiles have to be relocated/transported to</li> </ul>	<ul style="list-style-type: none"> <li>The initial plan was to relocate the entire crocodile farm to Gelephu. However, the Phuentsoling Thromde decided to retain a section of crocodile farm for tourist purposes and to generate income. The relocation of the reptiles</li> </ul>	A total of 23 crocodiles were relocated/ transported to Gelephu farm.	Complied

SN	Activities at the Construction site.	Impacts	Mitigation Measures	Mitigation Measures Implemented	Remarks	Deficiencies/ Remarks/ Observations (To be completed by CSC)
			Jigmeling, about 13 KM from Gelephu town.	to Gelephu was carried out by the Department of Forests. Gelephu is about 200 km or 5 hours through the Indian highway. There was no casualty of any reptiles. Due to the current COVID pandemic, the farm has been closed to the public.		
5.	Water Supply	Water Supply lines should not be disturbed	<ul style="list-style-type: none"> <li>In the event of unavoidable damages, the water supply has to be immediately reinstated through an alternative arrangement.</li> <li>Water supply has to be reinstated immediately</li> </ul>	<ul style="list-style-type: none"> <li>Underground water supply lines were damaged at some locations during road and drain excavation which has been reinstated immediately.</li> </ul>	Informed Phuentsholing Thromde and has been reinstated	Complied
6.	Encroachment, disturbance and damage of religious and holy sites	Historical sites/ damage to archaeological monuments and unearthed evidence	<ul style="list-style-type: none"> <li>No historical, Cultural and Religious sites found along NBR premises/upon the discovery of archaeological relics.</li> <li>Notify the PMO to contact relevant government authority to investigate and undertake recovery.</li> </ul>	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>	Informed PT/MoHCA	Complied  Not found anything yet.



### III. COMPLIANCE TO ENVIRONMENTAL CLEARANCE

20. The Environmental Compliance of Northern Bypass Road (NBR) project was prepared as per terms and conditions of EC and implementation of the Environmental Management Plan (EMP) of the project. **Table 9** contains the compliance requirements and the status compliance of NBR.

**Table 9: Northern Bypass Road's Compliance with the Terms and Conditions of the Environmental Clearance**

No.	Compliance Requirement	Status
<b>I. GENERAL</b>		
<b>1</b>	The holder shall comply with provisions of the National Environmental Protection Act 2007, Environmental Assessment Act 2000 and its Regulation 2016, Waste Preservation and Management Act of Bhutan 2009 and its Regulation 2016, and the Water Act of Bhutan 2011 and its Regulation 2014	Construction has been completed and handed over to the relevant agency.  The site was monitored by the Dzongkhag Environmental Officer and Project Officials, PT as well as the site supervisor from the consultant firm.
<b>2</b>	The holder shall ensure that construction activities are in line with the Initial Environmental Examination report submitted for EC	Construction was as per the IEE submitted and as per the Environmental Clearance issued
<b>3</b>	The holder shall ensure that local communities, properties and any religious, cultural, historic and ecologically important sites are not adversely affected by the activities	The construction did not affect any sites of this nature.
<b>4</b>	The holder shall restore the damage of any public or private properties caused by the activities	No damage caused to public or private properties so far.  Any damages caused to private properties were discussed and the damages were restored.
<b>5</b>	The holder shall inform NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archaeological, and/or ecological importance	Such an incident did not occur.  If such an incident occurred, NECS and relevant authorities were informed.
<b>6</b>	The holder shall erect a signboard at the take-off point of the main entrance of the activities stating the name of the activities and contact address	Safety signboards were at strategic locations which necessitated specific warning signs.
<b>II. ENVIRONMENTAL STANDARDS</b>		
<b>7</b>	The holder shall comply with the existing Environmental Standards	Complied
<b>III. IMPORT AND USE OF SECONDHAND EQUIPMENT</b>		
<b>8</b>	The holder shall ensure that the import and use of second-hand equipment and machinery are strictly prohibited.	No second-hand equipment was used at the site. All required equipment were purchased and were all found to be in good condition.
<b>IV. WATER USE AND MANAGEMENT</b>		
<b>9</b>	The holder shall ensure that activities do not disrupt the water flow and pollute the water bodies	The NBR project area was along the Amo Chu river bank, but mitigation measures were taken to ensure the water body does did not get polluted.

10	The holder shall ensure that 30 meters or 100 feet buffer is maintained from the water resources at all times	Complied
<b>V. WASTE PREVENTION AND MANAGEMENT</b>		
11	The holder shall manage wastes generated from the activities (activity site, labour camps, offices etc.) with the application of the 4R (reduce, reuse, recycle, responsibility) principle and other environmentally friendly methods of waste management	Two pits were made for organic & non - organic waste, with sufficient re-use bins within site camps and offices. Tarpaulin was used to cover lightweight materials at the site.
12	The holder shall ensure that import and use of hazardous wastes are strictly prohibited	The project did not require any use or import of hazardous materials. Thus, such waste will be generated.
<b>VI. MANAGEMENT OF EXCAVATED MATERIALS AND RUN-OFF</b>		
13	The holder shall dispose of excess excavated materials at the pre-identified approved dumpsite only	Excavated materials were disposed of at disposal site near Toorsa river approved by the Phuentsholing Thromde. The site currently falls under the PTDP project and the materials were reused for their project activity.
14	The holder shall put appropriate measures to avoid erosion and landslides	Erosion/landslide issues occurred at the site during monsoon season, but mitigation measures were taken.
<b>VII. IMPLEMENTATION PLAN</b>		
15	The holder shall prepare a detailed implementation plan focusing on the implementation of terms and conditions of this EC and submit it to NECS within three (3) months from the date of issue of this EC	The EMP was updated to incorporate requirements of NEC's terms and conditions
<b>VIII. MONITORING AND REPORTING</b>		
16	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 environmental focal person	Contractor appointed Safety Officer. From PIU, PM monitored the safety issues and from CSC Environmental Focal Person monitored this.
<b>IX. RENEWAL AND MODIFICATION</b>		
17	The holder shall ensure that renewal of this EC is processed at least three (3) months before its expiry along with a copy of EC and a report on the implementation of its terms and conditions	Yes
18	The holder shall obtain prior approval from NECS for any modification to the existing proposal/application	There was no modification in the proposal
<b>X. RESERVATION</b>		
19	The NECS may stop the activity or impose additional terms and conditions, as may be deemed necessary	N/A
20	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	N/A
21	The holder may adopt best practices in executing these terms and conditions to avoid adverse environmental impacts.	N/A

#### IV. MONITORING ACTIVITIES UNDERTAKEN

##### A. Air and Noise Quality Monitoring

21. Ms. Sonam Deki, Environmental Specialist from Gyaltsen Consultancy, Thimphu conducted the final ambient air quality monitoring along NBR I from 15 –19 January 2019. NBR II project was completed on 12 March 2021 and final air quality monitoring was conducted from 28 -30 January 2021. The purpose of the ambient air quality monitoring was established to collect ambient air quality for the project area during the construction phase, so that future air quality variation could be assessed during or after the project completion (operation phase). To ensure that the project did not cause or contribute towards the growing pollution in Phuentsholing town. Tests were conducted in various locations within and outside the project vicinity. The air quality monitoring was conducted over 24 hours. The results of the air quality monitoring from September 2017 – January 2021 are reflected below in a bar graph.

## 1. Ambient Air Monitoring of NBR I & II Project Area

### i) Ambient Air Quality Monitoring from September 2017–January 2021

**Table 10: Air Quality Monitoring for NBR II (January 28 - 30 2021)**

Table 10: Air Quality Monitoring for NBP II (January 28 – 30 2021)						
S.N	Location	Date	In Microgram per cubic meter		Environmental Standards, 2010	
			TSPM	PM 10	TSPM	PM 10
	Northern Bypass Road					
1	Crocodile Farm	28/01/2021	150	125	200µg/m³	100µg/m³
2	End point	30/01/2021	63	119	200µg/m³	100µg/m³

### Result and Interpretation of Air Quality Monitoring

22. The **NBR I** is along the main commuting route to the Phuentsholing – Samtse Highway, the Phuentsholing Highschool and RICB Colony. Due to this reason, the air quality along with the NBR testing locations over the years have always been a little above the NEC's mixed area permissible limits. Apart from the project activities, issues such as constant movement of speeding heavy and light vehicles, dusty roads, multiple private constructions activities and wind are all contributing factor towards the high air pollution. The project overall did not contribute in the air pollution of Phuentsholing town.

23. As reflected in **Table 10** above the TSPM in both the locations for NBR II testing conducted on 28 – 30 January 2021 were within the permissible limits. Whereas the PM10 for both the locations were above the permissible limits.

24. Multiple external factors are contributing to the high level of air pollution at the two locations. First and foremost, the test was conducted during the winters, which is a dry season, with hardly any rain and strong winds. The NBR II is not the only ongoing project in Phuentsholing town, the evening winds could be blowing away construction materials that are not covered properly which are another contributing factor.

25. The two locations are also commonly used routes for commuter and people travelling from various town into Phuentsholing. The movement of vehicles causes the settled dust to spiral into the air and remain suspended in the atmosphere, before settling away from the main source.

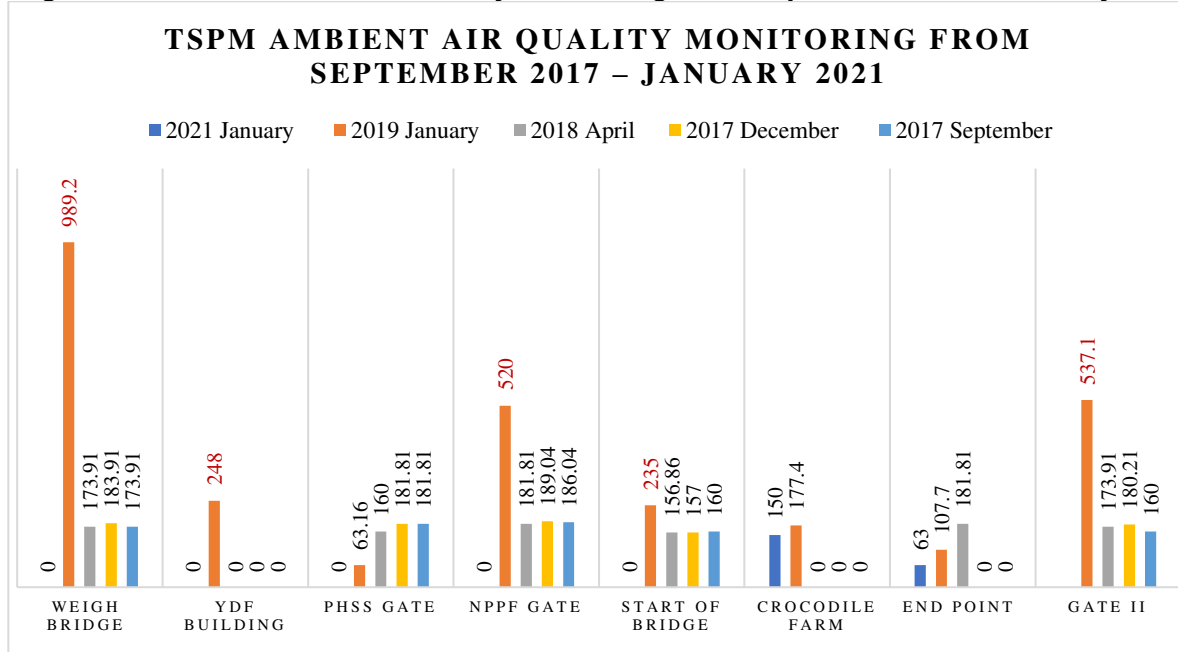
### Mitigation Measure

26. To ensure that the air pollution was controlled, activities such as the sprinkling of water along the construction area and beyond. It was also ensured that all construction materials were

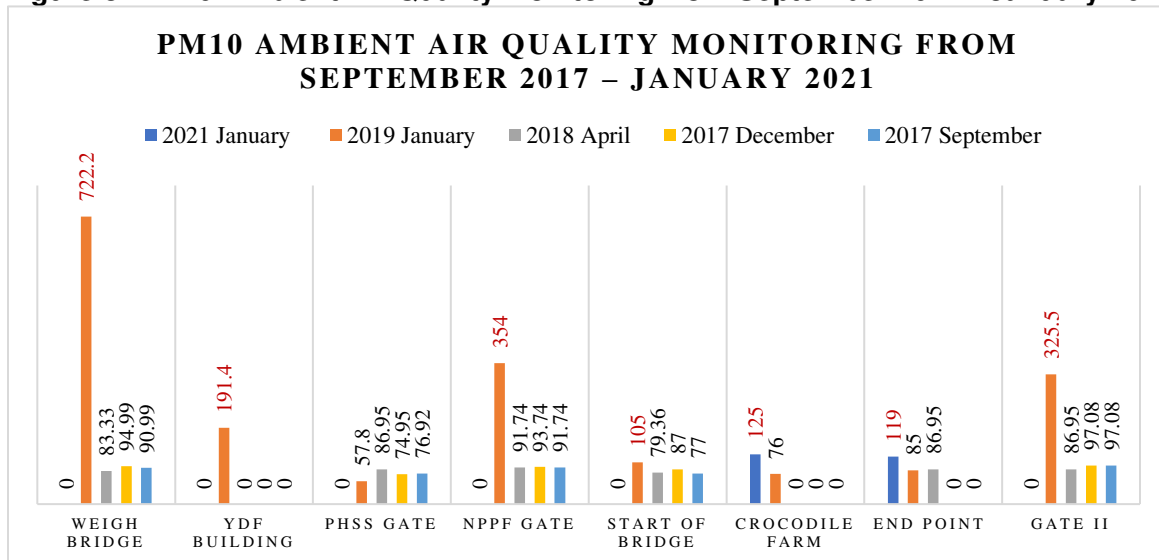
covered, and all vehicles were encouraged to use tarpaulin during transporting of materials. For the safety of the worker, the contractor and the consultant engineer at the site were informed and encouraged to wear suitable gears and were provided with N95 or equivalent mask.

27. To get a clear comparison of all past tests, a bar graph of Ambient Air Quality Monitoring from September 2017 – January 2021 is reflected below. As you can see the air qualities monitored are either slightly on the higher spectrum or above the permissible limits of the NEC's mixed area emission standards.

**Figure 2: TSPM Ambient Air Quality Monitoring from September 2017 - January 2021**



**Figure 3: PM10 Ambient Air Quality Monitoring from September 2017 - January 2021**



## 2. Noise Quality Monitoring of NBR I & II Project area

28. The Noise test was conducted to ensure that the project did generate too much sound to impact the community. The locations for the noise testing were dispersed similarly to the air quality monitoring to ensure that the noise was not only generated from project activities but activities outside the project and natural factors. The overall noise quality in the NBR area over the years were mostly been within the permissible limits of the NEC's mixed area, except for a few tests. Apart from the project activities being a contributing factor towards the high noise pollution, it could have also been due to human activities from the residents along the project area, movement of heavy vehicles, natural factors such as heavy winds, thunderstorms and private construction activities. The project overall did not contribute enormously towards the air pollution of Phuentsholing town.

### Result and Interpretation of Ambient Noise Level Monitoring

**Table 11: Noise Level Monitoring (Dba) for NBR II**

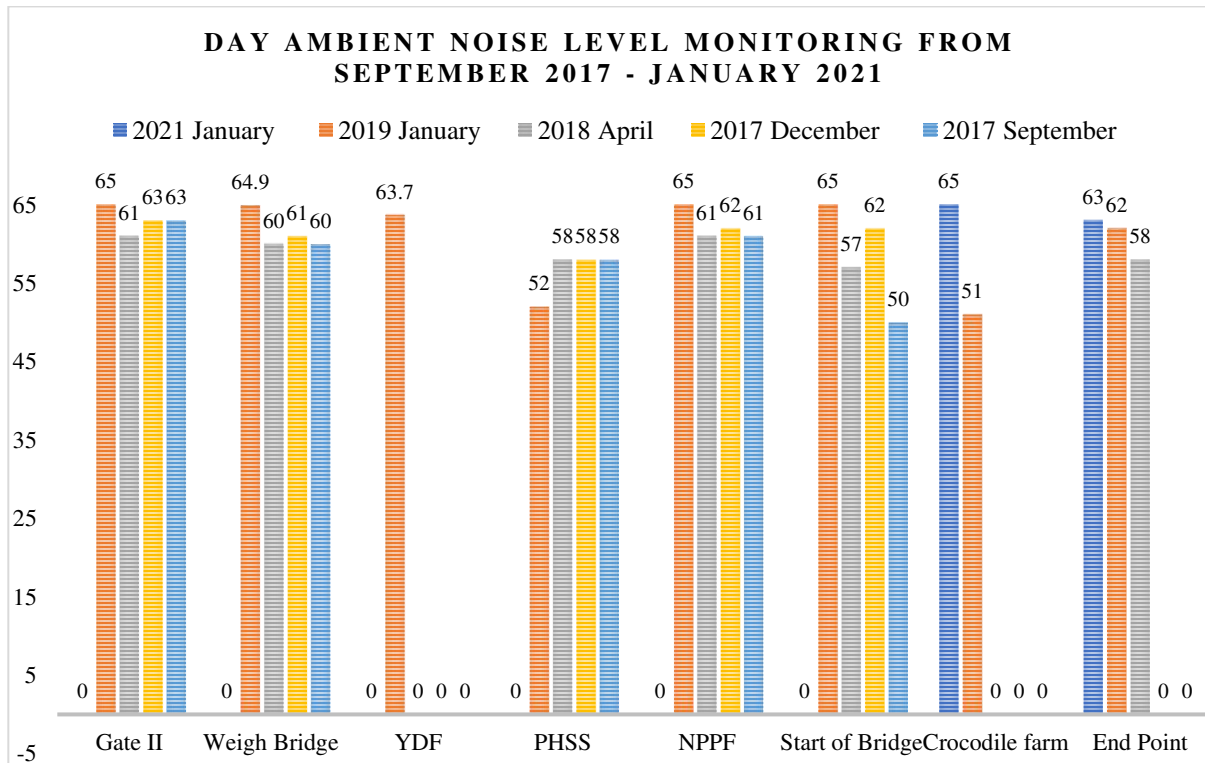
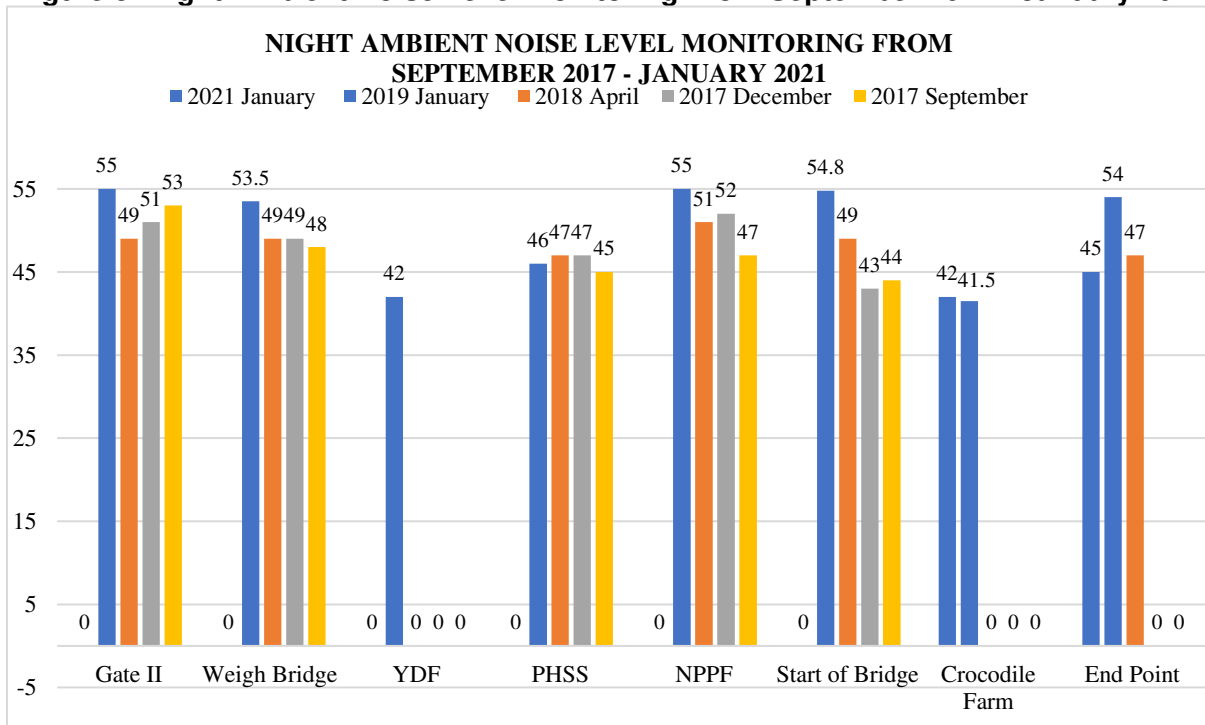
S.N	Location	Date	Day (Leq)	Night (Leq)
1	Crocodile Farm	28/01/2021	65	42
2	Endpoint	30/01/2021	63	45

29. The **NBR I** being along the main commuting route to the Phuentsholing – Samtse Highway, the Phuentsholing Highschool and RICB Colony. **NBR II** is along the main highway coming into Phuentsholing town, some of the main reasons for noise during the morning house was due to movement of vehicles, machinery, drilling, digging, and other construction activities along the project area. During the evening hours, the primary cause of noise pollution was from the movement of vehicles, machinery and natural factors like the wind, and animals. All the noise caused by manmade activities are temporary and will not have a long term impact.

30. As reflected above in **Table 11** the noise monitoring for both day and night for the two locations along the NBR II are within the higher spectrum but within the permissible limits of NEC's mixed area. This could also be because of the limited movement of the vehicle due to restrictions by the Government to avoid unnecessary movement during the pandemic.

31. To ensure that the communities do not get affected by the noise generated from the project activities, all loud noise-generating work was stopped after work hours. Drivers were also informed not to unnecessarily honk their horn. The project could only monitor the noise from the project activities. The Noise monitoring test is conducted once during the day and the other at night time. The noise generated during the testing are not permanent, and will not have any future impact.

32. Below is a graphical representation of noise monitoring for both day and night from September 2017 – January 2021. As represented below the noise at all locations in the NBR I & II Project area have been within the permissible limits of the NEC's mixed area.

**Figure 4: Day Ambient Noise Level Monitoring From September 2017 - January 2021****Figure 5: Night Ambient Noise Level Monitoring From September 2017 - January 2021**

### i. Water Quality Test

33. Water quality test was conducted on 12 April 2021 conducted by Head lab technician from the water department from Phuentsholing Thromde. The following parameters Ph, Turbidity, Fecal coliform, and conductivity were tested at the Omchhu river. Of the parameters all were within the permissible standards set by the National Environment Commission, except for Ph and Fecal coliform. The two parameters were high due to:

### ii. High Ph:

34. There are many factors that can affect pH in water, both natural and man-made. Most natural changes occur due to precipitation (rain) and surrounding rocks. Man-made occurrence could be from waste water or discharges from construction etc. In addition,  $\text{CO}_2$  concentration due to photosynthesis, respiration and decomposition could all influence the pH level. Higher pH has more impact on the aquatic life than on humans, but it is still not advised to drink water from the river directly. The river water is not suited for drinking.

### iii. High Fecal Coliform (FC):


35. Indication of high FC is mainly due to fecal material from human or animal sources. The degradation of water quality can be associated with the areas undergoing rapid urban growth and sprawling suburban development. Along the river the residential, commercial and other urban land uses has tripled over the years, with improper drainage, which could be the main contributing factor. Along the river are multiple outlets releasing contaminated water from residents and commercial buildings directly into the river. The other reason could be the disposal of waste (diapers, sanitary pads, packaging etc) directly into the river. This is not only contaminating the river, but littering the river eventually impacting aquatic life. Another reason could be, there are pedestrian pathways through which the river is accessible. Passer-by's or workers from private construction located along the river could be defecating in the river. The river water is not suited for drinking unless it undergoes conventional treatment/disinfection for human consumption.

36. During the construction of the NBR the workers were provided with proper toilets, waste disposal bins and arranged waste drop off slots with the Thromde. This was to ensure that there was no littering or contaminating the surrounding areas with their waste and defecation.

37. Refer to **Figure 6** for the result of the water quality test.

**Figure 6 Water Quality Test Report for Amochhu**

Water Quality Test Report for Amochhu						
Date	Location	Ph (Range 6.50-8.50)	Turbidity(Range 5 NTU)	Fecial coliform (0/100 CFU/100ml)	Conductivity (1000 Umhos/cm)	Remarks
12-04-21	Amochhu near new bridge(lower kabreytar)	11.23	4.07 NTU	36/100 CFU	450.20 mg	Ph is high and fecial coliform is also high

Analysed by  
  
 Yeshi Dema  
 Lab Tech

Analysed by  
  
 Head water

## V. CONCLUSION

38. This Annual Environmental Monitoring Report covering the Northern Bypass Road under the SASEC Connectivity Project was prepared in compliance with the requirements of SPS 2009.
39. The contract package for Northern Bypass Road was awarded by Phuentsholing Thromde under the Ministry of Works and Human Settlement to M/s MarushinShitaka - Rigsar Construction (J/V).
40. Baseline data collection for air quality and noise level monitoring for the two projects was conducted by M/s Gyaltsen Consultancy. For NBR II air and noise monitoring were from January 28–30 2021.
41. The Environmental Clearances (EC) for both NBR was obtained from the National Environmental Commission. The EC for NBR is valid until 26 September 2020.
42. Occupational health and safety measures were compiled by issuing the necessary safety outfits like safety hamlet, safety gumboots, safety boots, safety jackets and a dust mask. Excavation of more than 1m depth was fenced for safety purposes. Water tanker was deployed to sprinkle water along the project road as and when needed to suppress dust. All the necessary facilities were provided to the labours and staff living within the construction area.
43. There were no complaints nor grievances lodged with Phuentsholing Thromde during the reporting period for NBR.
44. Contractor submitted the EMP on monthly basis and the EMP was cross-checked by SI/ES/RE and TL. Approved EMP's were attached with the monthly progress report and submitted to Phuentsholing Thromde.
45. The construction of NBR-I was started on 1 September 2017 and was completed on 27 January 2021 as per the revised schedule.
46. The crocodile farm is under the management of the Department of Forests, Ministry of Agriculture and Forests (MOAF). The initial plan was to relocate the entire crocodile farm to Gelephu. However, the Phuentsholing Thromde decided to retain a section of crocodile farm for tourist purposes and to generate income. The Phuentsholing Thromde relocated 23 reptiles. They were two different species 8 mugger crocodile and 15 small juvenile crocodiles to Jigmeling, about 13 KM from Gelephu town. Gelephu is about 200 km or 5 hours from Phuentsholing through the Indian highway. The relocation was carried out by the Department of Forests. There was no casualty of any reptiles during the relocation.
47. The Phuentsholing Crocodile Farm currently has three species of crocodile, four big mugger crocodiles, six small Gharial and five small Juvenile. The farm was closed to the public due to the COVID-19 pandemic.
48. No compensatory plantation was done as per contract provision, and the nature of the project. However, the Phuentsholing Thromde will be planting plants along with the dividers and in the roundabout.
49. Air and noise monitoring for the NBR II during January 2021 monitoring was restricted to the two main locations along the project boundary because of the COVID-19 pandemic. Testing



for other locations was conducted in the past to monitor the pollution level outside of the project vicinity. During the testing conducted on January 2021, other locations were unmonitored as it was located in higher risk areas or along the India border.

## VI. PHOTOLOG OF NBR I & II

### NBR I & II during construction



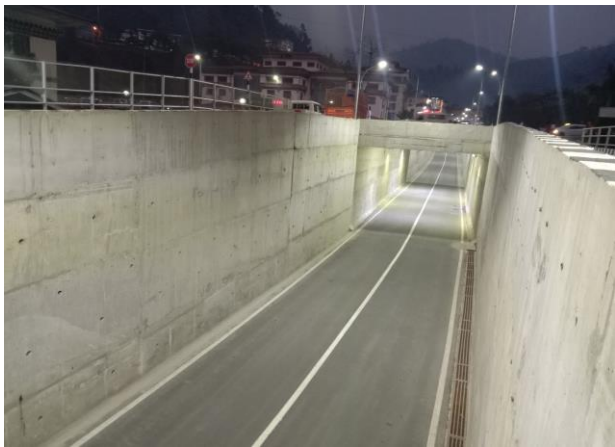




### NBR I After Completion

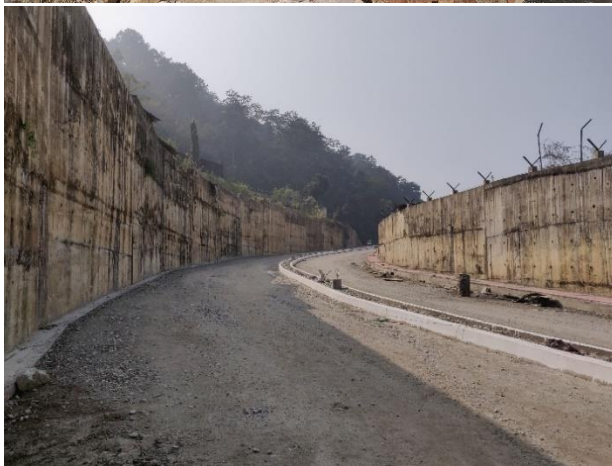




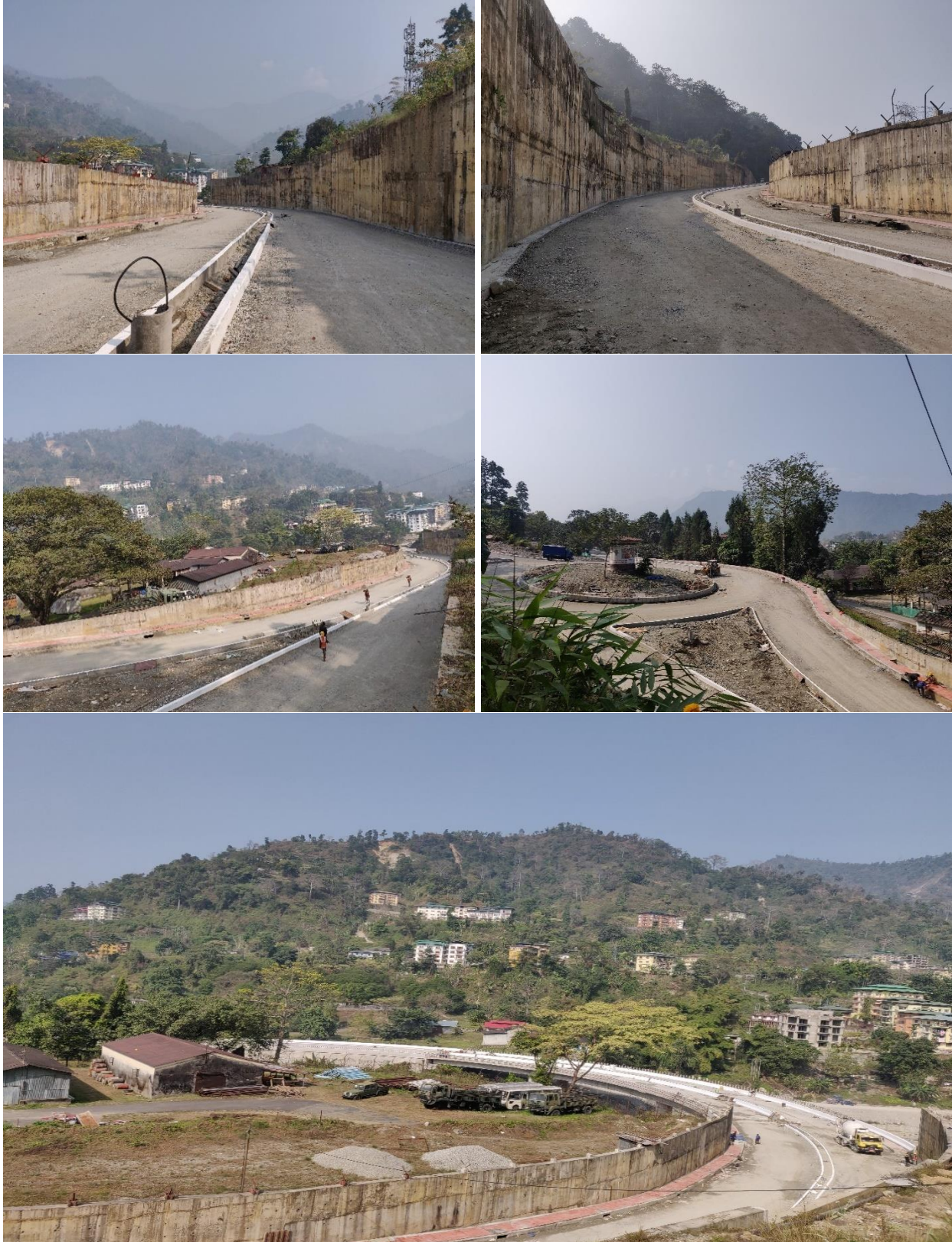




## NBR II During construction

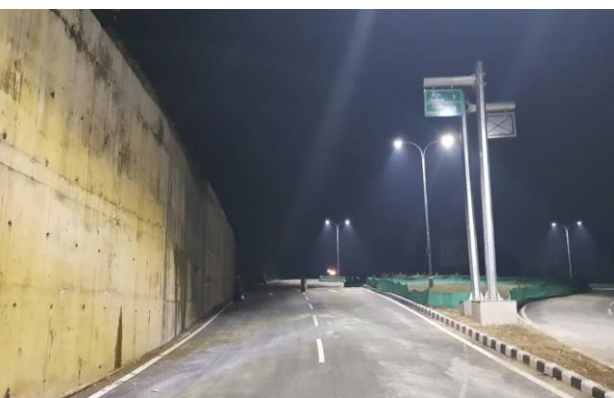


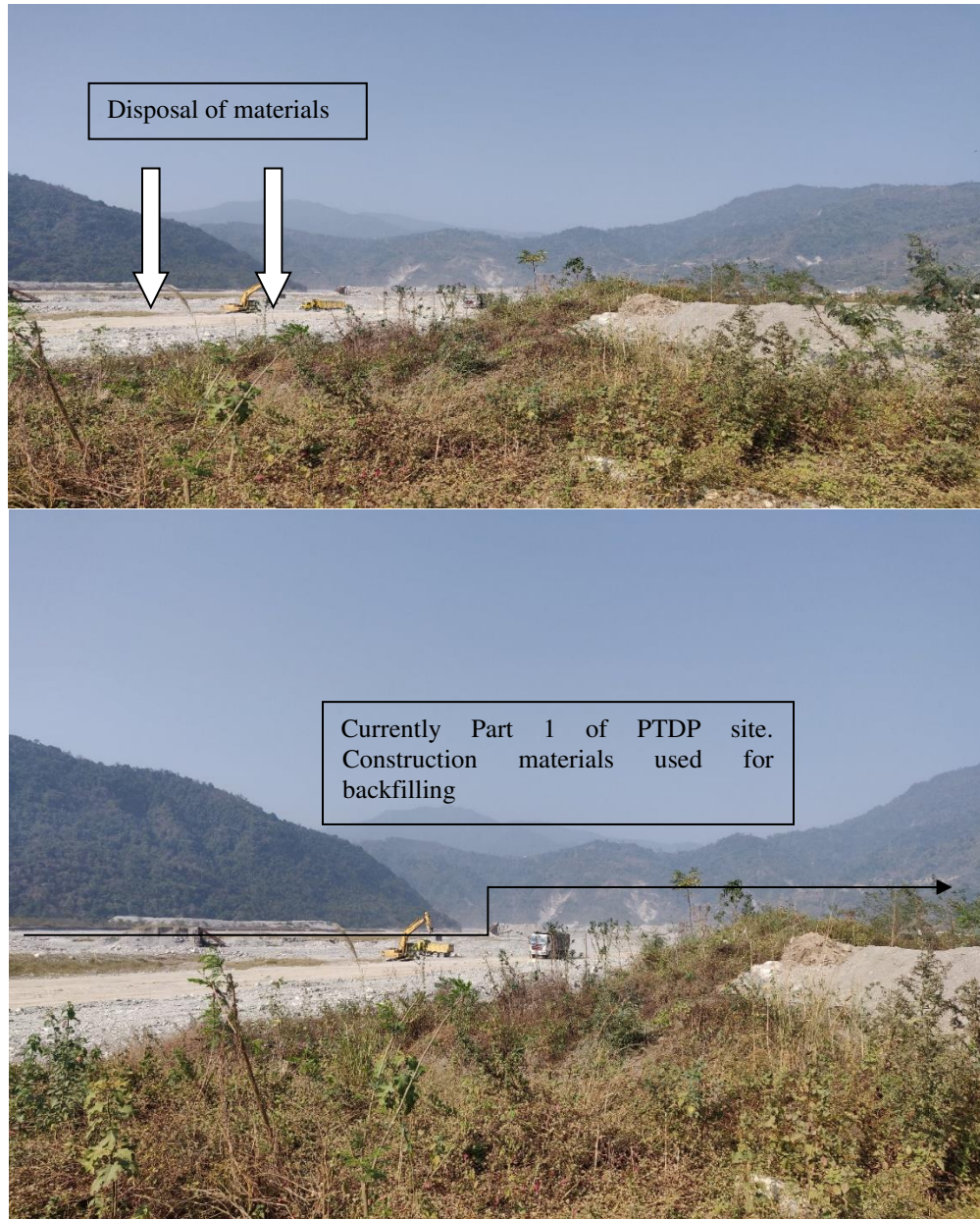






## NBR II After Completion



**DISPOSAL OF CONSTRUCTION MATERIALS**




## Images of drainage into the river






## APPENDIX 1: ENVIRONMENTAL CLEARANCE OF NBR RENEWED



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



NECS/EACD/Dzo-Chukha/3477/2020/ 1282 October 7, 2020

### ENVIRONMENTAL CLEARANCE

In accordance with Section 34.1 of the Environmental Assessment Act 2000 and Section 34 of the Water Act 2011, this Environmental Clearance (EC) is hereby renewed to Dasho Thrompon, Phuentsholing Thromde Administration for construction of Northern bypass at Phuentsholing Throm 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 Regulation for Environmental Clearance of Projects 2016 (RECOP 2016), Waste Prevention & Management Act of Bhutan 2009 and its Regulation 2012 (Amendment 2016), The Water Act of Bhutan 2011 and its Regulation 2014 and Revised Regulation on the Control of Ozone Depleting Substances (ODS) 2008;
  2. ensure that construction of bypass is in line with Initial Environmental Examination report submitted for EC;
  3. Ensure that local communities, properties and any religious, cultural, historic and ecologically important sites are not adversely affected by the construction of bypass;
  4. restore the damage of any public or private properties caused by the construction of bypass;
  5. inform NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance;
  6. erect a signboard at the take-off point of the main entry of the activities stating the name of the activities and contact address; and
  7. ensure that a copy of the environmental clearance is framed and displayed at the site office.
- II. Environmental standards**  
 The holder shall comply with the existing Environmental Standards 2010.
- III. Import and use of secondhand equipment and ODS**  
 The holder shall not use Ozone Depleting Substances in line with the Revised Regulation on the Control of ODS 2008.
- IV. Protection and management of water resources**  
 The holder shall:
  1. Ensure that construction of bypass does not disrupt the water flow and pollute the water

NEC, PO Box 466, Thimphu, Bhutan  
 Tel: (975-2) 323284/325956/324323/325998 Fax: (975-2) 323385  
 www.nec.gov.bt

- bodies; and
2. Ensure that 30 meter or 100 feet buffer is maintained from the water resources at all times.

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

The holder shall:

1. manage wastes generated from construction of the bypass (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; and
2. put appropriate measures to avoid erosion and landslides.

#### **VII. 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;

#### **VIII. 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 of EC and a report on the implementation of its terms and conditions failing which the applicant shall be liable for penalty as per the RECOP 2016; and
2. obtain prior approval from NECS for any modification to the existing proposal/application.

#### **Reservation**

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

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


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



**Validity:**

This EC is issued with validity from **October 7, 2020** until **October 6, 2021** for the construction of Northern Bypass only.

*This clearance is limited to environmental component only. The applicant may process and obtain other approvals/clearances for the proposed activity from concerned authority as per the rules in force.*

  
(Phento Tshering)  
**DIRECTOR**

To  
Dasho Thrompon  
Thromde Administration  
Phuentsholing  
Chukha

**Copy to:**

1. Guard File (Dzo-Chukha/3477/2020/), EACD, NECS for record.





## APPENDIX 2: ENVIRONMENTAL CLEARANCE OF NBR



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



NECS/ESD/Dzo-Chukha/3477/2017/ 1376

September 27, 2017

### Environmental Clearance

In accordance with Section 34.1 of the Environmental Assessment Act 2000 and Section 34 of the Water Act 2011, this Environmental Clearance (EC) is hereby issued to Dasho Thrompon, Phuentsholing Thromde for the construction of Northern Bypass Road at Phuentsholing Throm 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 The 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 NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance; and
6. erect a signboard at the take-off point of the main entry of the activities 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; and
2. ensure that 30 meter or 100 feet buffer is maintained from the water resources at all times.



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

The holder shall:

1. manage wastes generated from the 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 of excess excavated materials at the pre-identified approved dumpsite only; and
2. put appropriate measures to avoid erosion and landslides.

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

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

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

The holder shall 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 NECS for any modification to the existing proposal/application.

#### **Reservation**

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

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

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





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



NECS/ESD/Dzo-Chukha/3477/2017/ 1376

September 27, 2017

**Environmental Clearance**

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

**I. General**

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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 NECS and any other relevant authorities of any unanticipated or unforeseen chance-find of any precious metals or minerals or articles, that have economic, cultural, religious, archeological, and/or ecological importance; and
6. erect a signboard at the take-off point of the main entry of the activities 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; and
2. ensure that 30 meter or 100 feet buffer is maintained from the water resources at all times.

