

Due Diligence Report

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Bhutan: Responsive COVID-19 Vaccines for Recovery Project under the Asia Pacific Vaccine Access Facility

Prepared by the Ministry of Health for the Government of Bhutan and the Asian Development Bank.

ABBREVIATIONS

ADB	–	Asian Development Bank
BHU	–	Basic Health Units
CBWTFs	–	common biomedical waste treatment facilities
COVID-19	–	coronavirus disease 2019
ECC	–	environmental clearance certificates
HCFs	–	health-care facilities
MOH	–	Ministry of Health
NMS	–	National medical service
JFPR	–	Japan Fund for Prosperous and Resilient Asia and the Pacific
RGoB	–	Royal Government of Bhutan

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**Due Diligence Report on Waste Management
for
Responsive COVID-19 Vaccines for Recovery Project under the Asia Pacific Vaccine
Access Facility**

Loan 4199 and Grant 9230-BHU

**Project Management Unit, Ministry of Health
Waste Management Division, National Medical Services**

A. BACKGROUND

1. The *Responsive COVID-19 Vaccine for Recovery Project under the Asia Pacific Vaccine Access Facility* provides the government of Bhutan with immediate and flexible financing for COVID-19 vaccination program along with strengthening the accessibility and efficiency of essential health care services, routine immunization services and disease surveillance.
2. With total outlay of \$ 13 million, \$10 million (76.9%) is loan under ADB and \$3 million (23.1%) is granted from the JFPR.
3. The loan allocation comprises the rapid response component (RRC) to support the purchase of the APVAX eligible COVID-19 vaccines and,
4. The project investment component (PIC) financed by the Japan Fund for Prosperous and Resilient Asia and the Pacific (JFPR) grant will strengthen disease surveillance, while enhancing the accessibility of essential health care services and immunization.
5. The loan and grant were approved by the Asian Development Bank (ADB) on 29 July 2022 and the agreement signed on 5 August 2022. The loan and grant were made effective 18 August 2022 and the original loan closing date is 31 December 2025.
6. The Ministry of Finance (MOF) is the executing agency (EA) and the Ministry of Health is the implementing agency (IA) for the project.
7. With the improved COVID-19 situation in Bhutan and the availability of free COVID-19 vaccines from various donor countries, Bhutan on 1st June 2023, requested ADB to repurpose the remaining RRC financing under APVAX towards procurement of essential medical equipment.
8. Review mission from 4-12 September 2023, confirmed that the proposed changes mainly pertain to the reallocation of the undisbursed RRC loan toward PIC eligible expenditures and that the financial and lending terms of the RRC loan will remain unchanged.
9. With all other requirements completed, this report forms the part of safeguard compliance as per the review mission of 4-12 September 2023. This due diligence report presents an overview of the current status of regulatory frameworks and the existing capacity for managing medical waste. It aims to ensure the safe handling and proper treatment of medical waste produced during the project implementation. The report also suggests actions to improve compliance with existing regulations and strengthen the capacity of stakeholders to manage medical waste.
10. Overall, all the receiving health centers follow regulatory compliances and have the capacity to handle waste generated through project implementation.

B. IMPACT, OUTCOME, OUTPUTS AND ACTIVITIES

11. The project impact is set as: Negative health, social, and economic effects of the COVID-19 pandemic mitigated.
12. The project outcome is: Eligible population safely vaccinated against COVID-19 and delivery of PHC services and routine immunization programs improved.
13. The project has two outputs: Output 1- Safe and effective COVID-19 vaccines delivered, and Output 2 - Accessibility of primary health care and immunization services and disease surveillance capacity improved.
14. Through Output 1, the project was envisaged to procure an estimated \$9.31 million worth of vaccines (1.28 million doses) for (i) the initial two-dose regimen of COVID-19 vaccination for children aged 5–11; and (ii) additional doses of COVID-19 vaccines for the entire eligible population, following the NVDP and its update. This output will support the government in reaching 100% COVID-19 vaccine coverage. The vaccination campaign has already started, following the updated NVDP and COVID-19 vaccination protocols. The eligible population and additional dose requirements of each age group may be expanded following future regulatory approval of the use of COVID-19 vaccines granted by stringent regulatory authorities and WHO, and Bhutan's national regulatory authority.
15. Output 2, is fully financed by the JFPR grant, and this PIC output will support improving the accessibility of PHC services, including COVID-19 vaccination and routine immunization, for hard-to-reach populations. It will also help the government maintain the current level of COVID-19 disease surveillance services to address the Omicron variant infection wave and other possible COVID-19 variants in the future, as well as making further efforts to ensure the safety of health care personnel involved in providing COVID-19 care.
16. Major activities under the project include-
 - (i) Development of an operational guideline for the use, maintenance, monitoring, and evaluation of mobile medical unit vehicles, including a tracking mechanism for measuring the improvement of accessibility of service provision and health outcomes.
 - (ii) Procurement and deployment of 28 mobile medical unit vehicles under hospitals and PHC centers across the country to provide more efficient PHC outreach services.
 - (iii) Training for personnel involved in the operation of mobile medical units, including training on biomedical waste management, and capacity building support to the MOH to optimize the use of mobile medical units;

(iv) Procure and supply of medical and laboratory equipment, test kits, personal protective equipment, reagents, and other medical and laboratory consumables.

C. ENVIRONMENTAL SAFEGUARD COMPLIANCES

17. The project is categorized as C for environment safeguards given the fact that it neither entails civil works, nor activities with potentially adverse environmental impacts. However, the administration of COVID-19 vaccines financed under Loan 4199 and the operation of mobile medical unit vehicles and supplementary medical and laboratory consumables financed under Grant 9230 will generate waste including biomedical waste, which will require safe treatment and disposal.
18. The MOH had updated the Mission that planned common biomedical waste treatment facilities reported in the RRP of the project are well underway with the facility in Phuentsholing being operational and handed over to the Phuentsholing Thromde on 25 April 2022.
19. The installation of the facility in Mongar was completed in December 2022 below the Konbar farm road, about a 10-minute drive from Mongar town.
20. In addition to these two biomedical waste treatment facilities, an existing facility in Thimphu complements existing on-site treatment at health care facilities and regulated deep burial, particularly in hard-to-reach areas.
21. MOH in compliance with ADB is dis-allowing open-pit burning in hard-to-reach areas, and continuous training of healthcare workers in hazardous waste segregation and management, improving waste transport systems, and improving waste management reporting are being provided.
22. Also PMU will monitor where necessary the use of medical and laboratory consumables financed under the project.
23. In addition, MOH will ensure that the project financing will not be applied to the activities described on the ADB Prohibited Investment Activities List set forth in Appendix 7 of ADB's Safeguard Policy Statement (2009).

D. NATIONAL LEGAL AND REGULATORY FRAMEWORK AND ITS COMPLIANCE

24. According to the National Guidelines on Infection Prevention and Control and Medical Waste Management for Healthcare Facilities, Medical waste refers to all categories of waste generated from health facilities, clinics, animal husbandries, veterinary hospitals and other clinical laboratories, and home-based treatment of patients.

25. Medical waste in Bhutan is therefore disposed of in a scientifically sound manner through segregation, collection, and treatment in an environmentally sound manner, which reduces the negative impact on workers' health and the natural environment.
26. As per the Guideline on Infection Control and Medical Waste Management for Healthcare Facilities, all health-care facilities (HCFs) are required to put in place mechanisms for effective disposal of medical waste at the facility itself or through common biomedical waste treatment facilities (CBWTFs).
27. The equipment procurement under APVAX repurposed loan is expected to generate waste which are regularly being managed by HCF so they can easily handle the amount and waste. Almost 90% of the waste directly associated with procurement is categorized as e-waste, which is subsequently condemned and handed over to the Department of National Properties. Regarding infectious waste, all healthcare facilities are required to either autoclave or use chemical disinfection before disposal, ensuring it is safe.
28. As per the Guideline on Infection Control and Medical Waste Management for Healthcare Facilities, medical waste is classified into five categories based on treatment options—yellow, red, brown, purple and blue.
29. Biomedical waste under the red category includes cotton swabs, discarded personal protective equipment, and other clinical laboratory waste, attenuated vaccines cotton swabs, pharmaceutical waste like glass ampoules, and vials. The yellow category includes waste sharps including metals, needles, syringes with fixed needles, needles from needle tip, broken or discarded and contaminated glass, medicine vials and ampoules except those contaminated with cytotoxic wastes. Expired or discarded medicines, pharmaceutical waste like antibiotics, glass or plastic ampoules, vials etc. come under the brown category. General municipal waste such as packaging material come under the blue category.
30. The key legislations and guidelines governing the management of municipal waste and solid waste are given in Table 1.

Table 1: Key Regulatory Documents for Biomedical and Solid Waste Management

S No.	Legal Requirements	Year	Requirements	Applicability	Compliance Status
hcf1	National Environment Strategy for Bhutan	1998	Aims to maintain a balance between environment and development. It will help in establishing vaccination centers with proper waste treatment facilities.	Applicable for all Healthcare Facilities	In-terms of the compliance status, sharp boxes with biohazard symbols are available at all HF's for sharp disposal like needles. Once the sharp box is 3/4th full, sharps are autoclaved and eventually incinerated or disposed of in deep burial pits where incinerator facilities are not available.
2	The Environmental Assessment Act	2000	This Act requires competent authority to obtain environmental clearance certificates (ECC) before any construction project starts.	Applicable for all Healthcare Facilities	Prior to the construction of Healthcare Facilities, ECC is sought by the relevant agency/division that sees the overall construction i.e currently Policy and Planning Division, Ministry of Health (PPD, MoH).
3	Regulation for the Environmental Clearance of Projects	2016	The environmental clearance procedure is described in this regulation.	Applicable for all Healthcare Facilities	The procedures outlined in the document are followed by PPD, MoH while obtaining the ECC.
4	Thromde Act of Bhutan and Thromde Rules	2007 & 2011	The Act designates the Thromde as the competent agency for issuing environment clearance. The	Applicable for all Healthcare Facilities	Based on the value of the construction project, clearance is sought either at the Dzongkhag level or from the Headquarters of the Ministry of

			district environmental office is the designated authority for the construction of Basic Health Units (BHU) in rural areas or rural HCFs. It will help to create health care establishments and waste management facilities.		Environment and Climate Change.
5	Rural Construction Rules	2013	It sets the rules to facilitate planned and harmonious development of settlements in Bhutan. This also complements the provisions of the Bhutan Building Rules. It applies to the construction of deep burial pits in rural areas, ensuring that it will be a safe and environment friendly waste treatment facility.	Applicable for all Healthcare Facilities	Screening tool is available for any health infrastructure development. Standard designs are approved before construction.
7	Thimphu Municipal Development Control Regulations (2004)	2004	Combined medical waste treatment facilities in Thimphu may be regulated and		

			comply with this rule.		
9	Bhutan Building Regulations (2018)	2018	This regulation ensures that approval is sought for any sort of construction	Applicable for all Healthcare Facilities	All approvals are sought for before the construction of health infrastructure.
10	National Health Policy	2011	Provides guidance to the Ministry of Health (MOH) to gain its national and international health goals as guided by the constitution. It will help to maintain balance with national and international standards.	Applicable for all Healthcare Facilities	All works of healthcare facilities contribute towards the national health policy.
11	Health Service Standards	2019	Identifies standards for BHUs and satellite clinics.	Applicable for all Healthcare Facilities	This Health Service Standard is applicable for all Hospitals. Based on the service standard, the HR including the support staff for medical waste management is deployed.
12	Procurement Rules and Regulations	2009	Defines government standard and bidding processes for all equipment and construction works including waste management facilities and HCFs.	Applicable for all Healthcare Facilities	To ensure compliance, procurement officers are available at the Ministry of Health, National Medical Services, and at the Dzongkhag level for district hospitals.

13	Disaster Management Act of Bhutan	2013	The Act contains a national health emergency and disaster contingency plan established to secure the public from the adverse effect of disease outbreaks. For that purpose many health care establishments were constructed and effective coordination between authorities developed.	Applicable for all Healthcare Facilities	In accordance with this act, the Ministry of Health developed the Health Emergency and Disaster Contingency Plan in 2016. Recently, a consultative meeting was held to incorporate a medical waste component into the contingency plan. Additionally, routine mock drills are conducted annually at all healthcare facilities.
14	Waste Prevention and Management Act of Bhutan	2009 & 2012	Promotes the principles of 3Rs (reduce, reuse, and recycle). Laws and regulations discuss waste reduction at source and promote environmental segregation, reduction, recycling and waste disposal.	Applicable for all Healthcare Facilities	As per this act, the Infection Control and Medical Waste Management Guideline 2018 has been developed which is currently being reviewed with the assistance from UNDP. Additionally, regular monitoring is done by the IPC (Infection Prevention and Control) focals who are basically nurses available at all HFs.
15	Bhutan Medicines Rules and Regulations	2012	Healthcare Facilities are required to separate and record the amount of waste generated and keep it	Applicable for all Healthcare Facilities	It includes provisions for import and export authorization, inspection and surveillance of medicinal products, advertisement of medicinal products, lot

			separately until disposal.		release of vaccines and biologicals, and outlines offenses and penalties.
16	Medicine Act	2003	The sale and distribution of expired medicines is prohibited under the Act. It will also officially prohibit expired vaccine use.	Applicable for all Healthcare Facilities	Drug Regulatory Authority, under Bhutan Food and Drug Authority monitors the compliance. In case of hospitals, expired drugs either undergo chemical dilution or are returned to Pharmacy for disposal. High end antibiotics and other strong drugs like the ones used for cancer treatment are incinerated.
17	Waste Prevention and Management Act of Bhutan and Chapter IV of the Waste Prevention and Management Regulations	2009 and 2012	Municipal authorities are liable for waste management, transportation, and disposal of designated sites, and for the development of public-private partnerships for waste management. While any type of waste is punishable by the dumping law, all waste must be approved by the Thromde's Environment Department who	Applicable for all Healthcare Facilities	While there are waste disposal and transportation mechanisms available at key locations like Thimphu, Phuentsholing, Gelephu and Mongar, in many places, the compliance to this act is poor. Given financial constraints, proper disposal and collection of medical waste is not available. Private partnership is poor in terms of disposing and recycling medical waste.

			will identify appropriate disposal sites. Local authorities (Dzongkhag, Tshogdue, and Thromde) are liable for the waste management in their area. They investigate and provide approval for waste management facilities, landfill locations and approve collection of waste management services. It will insure vaccine waste management.		However, this is not an issue in terms of e-waste which is surrendered to DNP and later auctioned to private vendors.
18	Guidelines on Infection Control and Health Care Waste Management as well as Guideline for Disposal of Pharmaceutical Waste	2014	Outlines the process of segregation, transportation, storage, disposal and recording of pharmaceutical waste to help in vaccine waste management.	Applicable for all Healthcare Facilities	Designated Infection Control Focal are available at all Healthcare Facilities and they are mandated to implement the measures reflected in the National Guideline. These include: • Segregation of medical waste,

19	The National Guideline on Infection Prevention and Control and Medical Waste Management for Healthcare Facilities	2018	Outlines waste that can be disposed of in deep burial pits, as well as the treatment required before disposal, such as autoclaving or chemical disinfection for solid hazardous waste. Needles are guided to shred for autoclaving and disinfecting. The guidelines also outline the values for deep grave holes construction such as minimum distance, seating, depth and width, which includes Environmental Management Plan (EMP).	Applicable for all Healthcare Facilities.	transport and storage. • Disposal of medical waste. • Recording and reporting. • Capacity Building for support staff on medical waste
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E. BIOMEDICAL WASTE MANAGEMENT PLAN FOR THE PROJECT

31. Healthcare waste management is crucial for health projects for ensuring safe and responsible elimination of waste produced. Proper management of healthcare waste is imperative to safeguard the well-being of healthcare professionals, patients, and the environment against potential health risks. Biomedical waste encompasses a broad spectrum of materials, spanning from infectious and hazardous waste, such as used syringes and contaminated dressings, to non- hazardous waste like paper and packaging.
32. The National Guideline on Infection Control and Medical Waste Management provides clear guidance on management of medical waste to minimize risks to health care workers and the environment.

33. Bhutan has recently achieved some significant development in the medical waste management sector. All HCFs are supplied with color-coded waste bins for proper waste segregation at source and needle cutters/needle destroyers.
34. Through a previous ADB supported project (Health Sector Development Program), waste storage and deep burial pits have been constructed in eight districts. Along with the infrastructure equipment like waste autoclave, weighing machine, waste shredder were also procured and distributed across the country.
35. More recently, National Medical Services is implementing the Healthcare Waste Management Project supported by UNDP. Under this, 112 numbers of waste autoclaves along with PPEs and 100 weighing scales have been procured. Additionally, capacity building training on healthcare waste management has been rendered to 312 waste handlers across primary healthcare centers, private diagnostic centers, municipal waste collectors and the private waste sector.

F. WASTE GENERATION FROM THE PROJECT

36. The project is expected to generate waste in five categories as indicated below.
 - (i) E-Waste: E-waste is a term used to cover all items of electrical and electronic equipment (EEE) and their parts that have been discarded by their owners as waste without the intent of reuse (Zangpo et al., 2016).
 - (ii) Infectious Waste: Contains potentially pathogenic organisms which have the potential to cause infections. This includes, laboratory cultures stocks, live or attenuated vaccines, human and animal cell culture, infectious agents from research laboratories, wastes from biological, toxins, dishes and devices used for transfer of cultures, used syringes and contaminated materials (National Guideline on Infection Control and Medical Waste Management, 2018).
 - (iii) General Waste: Waste free of pathogenic microorganisms or hazardous substances. Therefore, waste is harmless and does not need special handling or treatment (National Guideline on Infection Control and Medical Waste Management, 2018).
 - (iv) Chemical waste: Laboratory reagents, X-ray film developer, disinfectants and others like Deltamethrin etc. (National Guideline on Infection Control and Medical Waste Management, 2018).
 - (v) Heavy Metals: Mercury from broken thermometers and mercury sphygmomanometers, dental amalgam, cadmium from batteries, tube lights, and bulbs (National Guideline on Infection Control and Medical Waste Management, 2018).

37. The National Guideline on Infection Prevention and Control and Medical Waste Management for Healthcare Facilities (MOH, 2018) categorizes all biomedical waste and specifies the corresponding treatment and disposal procedures.

38. Table 2 provides a comprehensive overview of the types of biomedical waste that will be generated during the project implementation and delineates the methods for their segregation, treatment, and disposal in accordance with the aforementioned guidelines.

Table 2: Collection, transportation, treatment & disposal of hazardous medical waste

Type of waste	Collection	Transportation	Treatment Method	Disposal
Infectious waste	When the bin is $\frac{3}{4}$ full	Only on specified waste trolley or cart	1 Autoclaving 2. Chemical disinfection 3. Incineration	Municipal landfill
Chemical waste	Collect in the dedicated container		Dilute with water 1:3 ratio	Discharged into sewerage
Heavy Metals	Storage		Return to the manufacturer	
General Waste	No Treatment		Dispose at Landfill/Recycle	
E-Waste	Storage		Surrender to Department of National Properties and auction to relevant vendors	

39. Table 3, shows the amount of medical waste generated by health facilities in Bhutan. In the year 2022, the total medical waste generated by health facilities and affiliated institutes, including the National Traditional Medicine Hospital (NTMH) and the Royal Center for Disease Control (RCDC), amounted to 814 metric tons. This reflects a 12% increase compared to the previous year's waste report. The increase is primarily attributed to the implementation of a standardized weighing scale in numerous health facilities, enhancing the accuracy of waste measurements compared to the approximate estimations used in the prior waste data.

40. Annexure 1 outlines the treatment and disposal procedures for the equipment listed under the repurposed loan. Since the procurement under the repurposed loan primarily involves purchasing medical equipment for various departments in Regional Referral and District Hospitals, the waste generated when this equipment breaks down or reaches the end of its life is classified as e-waste. This categorization was confirmed during a consultative meeting with Mr. Birman Rai, a Biomedical Engineer from JDWNRH.

Consequently, almost 90% of the waste associated with the procurement, except for certain items like cupping sets and enema mugs, falls under the e-waste category. Regarding disposal, e-waste is condemned once it is fully broken or has reached its end of life and is then surrendered to the Department of National Properties. The Department auctions the e-waste collected from government offices to local scrap dealers, who in turn sell it to external markets such as India.

41. Unlike infectious waste, e-waste does not require treatment prior to disposal. This is also applicable for the general waste like Bed Pan, Spatula, Balance etc. which do not undergo treatment.
42. Also, e-waste being a new concept to Bhutan there aren't any separate regulations on it, however it is identified as a type of waste in the Waste Prevention and Management Act of Bhutan 2012.
43. Furthermore, Annexure 2 confirms that every health facility possesses the capability to safely treat and dispose of the waste originating from the APVAX repurposed loan. This adherence aligns with the guidelines outlined in the National Guideline on Infection Control and Medical Waste Management from 2018. Based on the hospitals mentioned in the equipment list, a facility-level assessment was carried out for five hospitals: Wangdue Hospital (60 beds), Phuentsholing General Hospital (60 beds), Central Regional Referral Hospital (150 beds), Bumthang Hospital (20 beds), and Jigme Dorji National Referral Hospital (350 beds). All five hospitals have inpatient facilities. However, in terms of proximity to the nearest Common Bio-medical Waste Treatment Facility, only two out of the five hospitals have accessible landfills nearby. Despite this, all five facilities have access to a waste collection system, temporary waste storage facilities, and the capacity to manage the waste generated from the repurposed loan. For infectious waste, staff from these five facilities are trained annually on medical waste segregation, and waste treatment equipment like autoclaves, color-coded waste bins, and signage are available.

Table 3: District wise annual medical waste generation in 2022

SN	Dzongkhag	No. of HCF	General Waste	Food	Pathological	Infectious/hazardous	Pharmaceutical	Sharp	Chemical	Pressurized	Radioactive	Total by Dzo
1	Bumthang	6	1769.6	514.4	50.4	1299.8	13.0	271.8	11.2	0.0	0.0	3930.2
2	Chukha	18	10597.7	10763.8	696.7	7706.7	141.3	717.0	15147.5	10.0	0.0	45780.7
3	Dagana	10	3875.1	525.0	76.0	2060.2	17.9	284.3	2.0	0.0	0.0	6840.5
4	Gasa	4	129.4	8.5	2.2	72.5	17.2	40.9	0.0	0.0	0.0	270.7
5	Haa	6	2144.0	50.0	21.7	1483.0	140.0	237.0	180.6	0.0	0.0	4256.3
6	Lhuentse	15	1076.3	423.3	18.7	397.4	83.6	159.1	10.6	0.0	0.0	2169.0
7	Mongar	30	60922.2	5475.8	443.2	67854.7	487.0	1029.0	10.5	0.5	2.0	136224.8
8	Paro	7	5864.3	3611.5	410.0	4938.4	21.0	689.4	2350.0	0.0	0.0	17884.5
9	Pemagatshel	24	2629.1	333.5	112.2	2104.2	38.5	445.4	8.0	11.0	1.0	5682.8
10	Punakha	9	18024.1	1563.0	408.1	6885.5	48.4	496.4	22.0	8.7	0.0	27456.2
11	Samdrupjongkha	18	7253.9	2760.2	501.0	5310.8	164.2	1342.0	286.0	0.0	0.0	17618.2
12	Samtse	21	9924.3	1224.1	988.1	6305.7	84.8	1195.5	103.0	171.0	0.0	19996.5
13	Sarpang	12	36793.5	3659.0	412.5	12365.2	104.5	519.9	0.0	0.0	0.0	53854.7
14	Thimphu	18	170442.8	2896.3	2895.9	167713.4	963.0	5765.1	923.0	0.0	0.0	351599.5
15	Trashigang	28	13480.4	1363.5	1015.1	4754.1	487.7	1366.2	0.0	2.0	217.0	22686.0
16	Trashiyangtse	9	3477.7	1032.1	79.0	1479.8	9.0	391.8	0.0	0.0	0.0	6469.4
17	Trongsa	11	1512.0	248.6	61.5	668.1	61.0	208.7	282.0	0.0	0.0	3041.8
18	Tsirang	9	11223.3	385.1	40.4	7856.4	294.9	561.2	1.2	85.0	0.0	20447.5
19	Wangdue	18	14194.0	1042.0	29993.4	13004.3	325.0	486.5	344.9	0.2	0.0	59390.3
20	Zhemgang	21	2580.7	350.6	81.8	1434.4	172.5	296.6	6.0	0.0	0.0	4922.6
			377914.5	38230.3	38307.9	315694.6	3674.4	16503.6	19688.5	288.4	220.0	810522.1

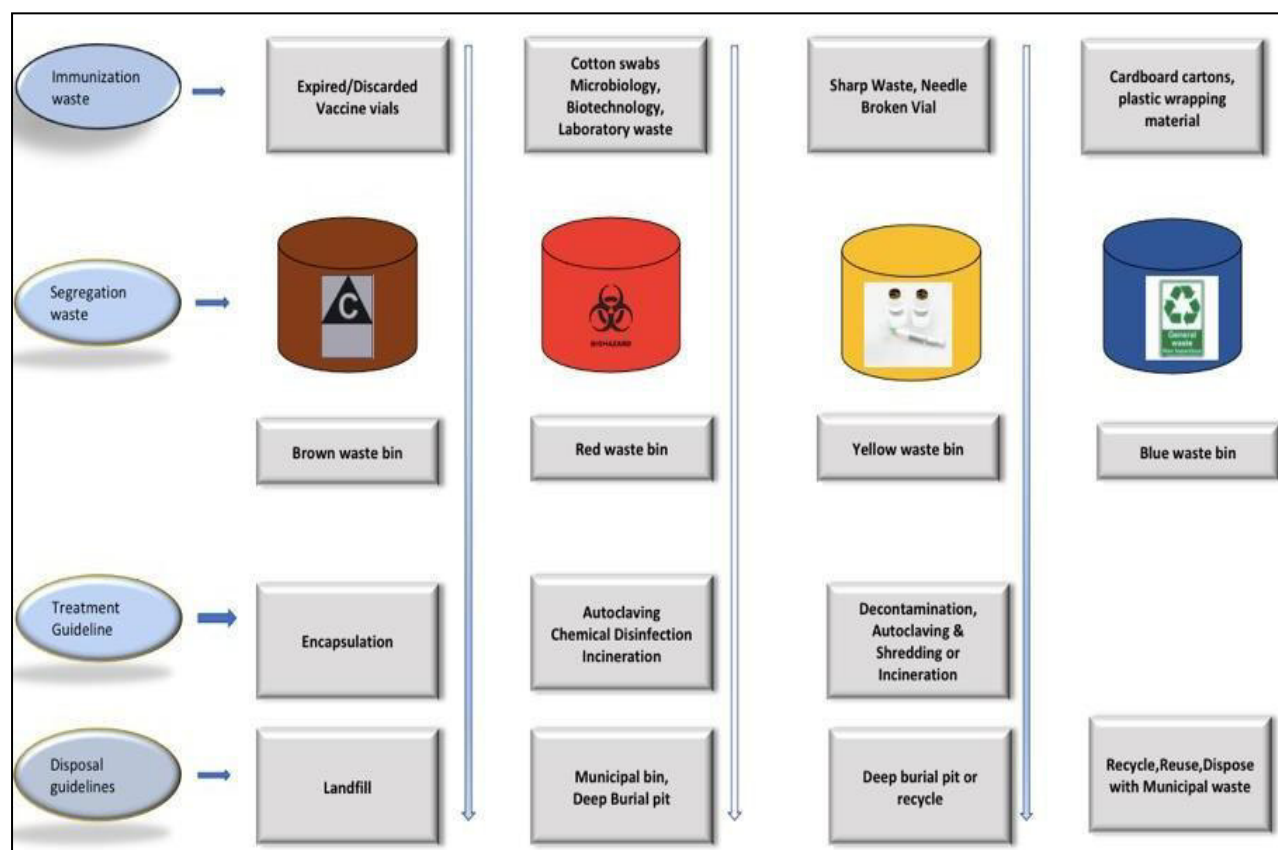
STEPWISE WASTE MANAGEMENT PLAN FOR THE PROJECT

44. The project is expected to produce mostly municipal waste and plastic waste largely stemming from the packaging materials involved. This includes items such as wood, cardboard boxes, plastic wrapping materials, thermocol and other packaging materials for the equipment. So implementation of segregation practices at the source of waste generation is anticipated to bring significant benefits. This will alleviate the burden on municipal waste management facilities of segregation later on and will also lead to a reduction in waste.
45. As indicated in Annexure 1, more than 90% of the waste from the equipment procurements are e-waste. But the e-waste is not immediate but will occur when the newly procured equipment is discarded after its lifecycle. While no treatment is required for this category of e-waste, all health facilities are required to store and eventually handover the e-wastes

to the Department of National Properties. There are adequate storage facilities for storing the discarded e-waste in all facilities.

46. According to the National Guideline, "Radioactive substances used for diagnostic or therapeutic purposes, including blood, urine, and feces of patients undergoing treatment or testing with radionuclides," are classified as radioactive waste. Based on this definition, none of the equipment in question appears to generate radioactive waste. However, if any radioactive waste is produced, the guideline provides clear instructions for its management—it must be stored in a lead container, appropriately labeled, and allowed to decay through proper storage.
47. According to the Waste Prevention and Management Regulation of 2012, government agencies are mandated to deliver their e-waste to the Department of National Property. Subsequently, the department auctions these items to e-waste management entities or any other entities deemed suitable by the Department of Information Technology and Telecommunication.
48. Regarding infectious waste, all healthcare facilities have waste autoclaves in place for decontamination and the safe disposal of such waste in landfills. The sample survey carried out for five healthcare centers shows they all have autoclaves in place. Also the autoclaves they have are as per their required capacity and can handle all waste generated by the healthcare facilities (*Annexure 2*)
49. The Health Sector Development Program funded by ADB which completed in February 2024, has constructed 101 deep burial pits, 25 waste storage rooms and distributed waste management equipment like waste autoclaves, needle burner, and syringe shredders. At the point of generation, all facilities are equipped with the basic color coded waste segregation system. The red color is for infectious waste, blue for food waste and green for general waste.

Figure 1: Shows the color code and process of waste management in Bhutan



Disinfection and Pretreatment:

50. Disinfecting infectious waste is a crucial element in the efficient handling and safe disposal of medical waste. Although obtaining the necessary equipment can potentially result in generating electronic waste, the reagents utilized in conjunction with the equipment and the procedures employed may lead to the creation of infectious waste, such as cotton swabs and gloves. In accordance with national guidelines, the protocol for handling infectious waste requires initial decontamination through the use of an autoclave machine or a 0.5% bleach solution. Further, in places like Phuentsholing, Thimphu and Mongar, the waste is further incinerated and the ash is dumped in the ash pit.

Disposal:

51. The waste collected in red bags (cotton swab and expired vaccines) is recommended to be incinerated as per The National Guideline on Infection Prevention and Control and Medical Waste Management for Healthcare Facilities (MOH, 2017). Where CBWTF and captive facility for incineration is absent, it can be disposed of in deep burial pits. Currently incinerators are available in Mongar (1 Number, 300 Kg), Thimphu (2 Numbers, 300 Kg)

and 100 Kg) and Phuentsholing (300 Kg). While these CBWTF are easily accessible, only one i.e. 100 Kg incinerator at Memeylakha, Thimphu is functional and fully utilized by Jigme Dorji Wangchuck National Referral Hospital. The one at Mongar is under-utilized given the lack of funding to procure fuel for its operation and the incinerator at Phuentsholing is in disrepair. One of the major challenges in terms of CBWTF is lack of funding to operate it, lack of ownership and untrained incinerator operator

52. The HCFs have well-constructed deep burial pits to manage medical waste where the CBWTF is not available or functional. These are existing burial pits, and most have been supported by ADB under the ongoing Health Sector Development Program, which supported the construction of 101 deep burial pits in primary health centers and hospitals in 8 Districts of Dagana, Mongar, Trashigang, Trashiyangtse, Pemagatshel, Smadrup Jongkhar, Trongsa and Zhemgang.

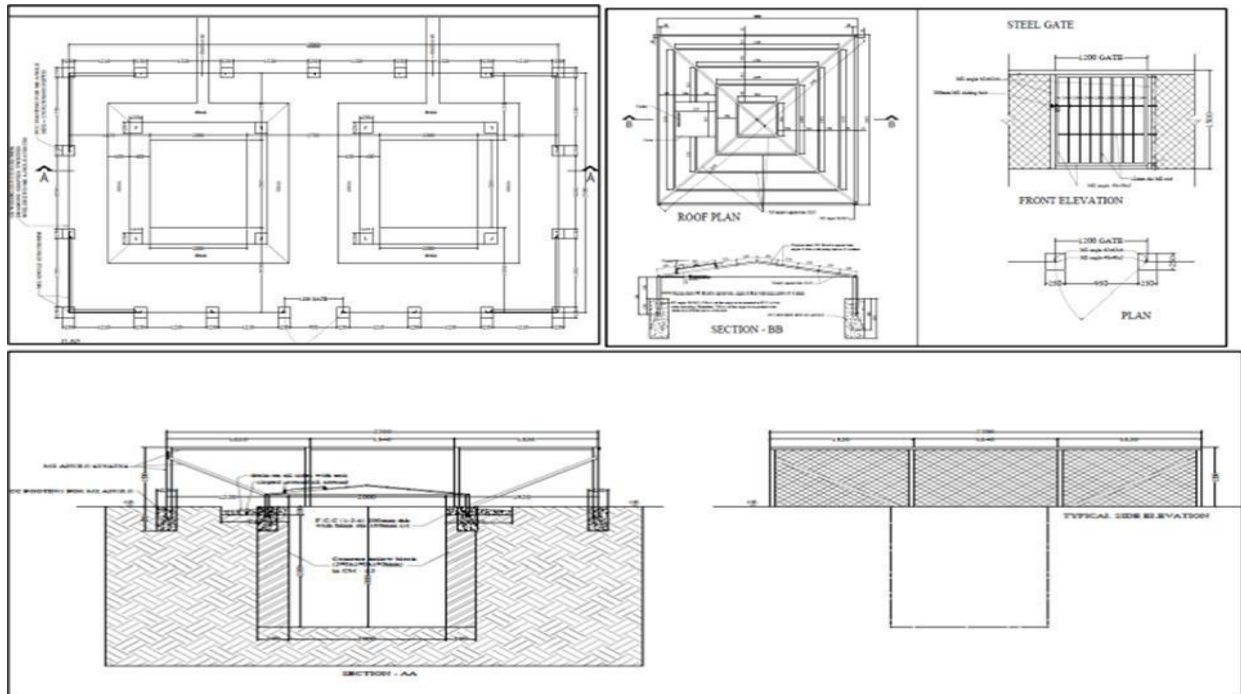
53. As per the National Guideline on Infection Control and Medical Waste Management (2017), all health facilities are required to construct deep burial pits. It includes standards for deep burial pits construction which are consistent with WHO's Safe Management of Wastes from Health-Care activities.

Figure 2: *Deep burial pit in one of the PHC in Dagana.*



54. Adhering to the Guideline on Infection Prevention and Control and Medical Waste Management for Healthcare Facilities (MOH, 2018), HCFs treat the infectious and hazardous waste before disposing off. Other general waste is segregated and stored for disposal. Measures such as securing the waste properly to prevent leakage during transportation, and the use of specified hazardous waste trolleys or carts are utilized for waste transport only and not for any other purpose. Waste disposal trolleys go through disinfection at the waste disposal site, and thorough washing later on. Additionally, with the support from UNDP, 5 new medical waste trucks have been procured for JDWNRH, Mongar Municipality, Wangdue Municipality, Phuentsholing Thromde and Gelephu Thromde.

Figure 3: Design of Deep Burial Pit



Record and Maintenance:

55. Properly maintaining records of biomedical waste generation, treatment, and disposal at the final Critical Control Point (CCP) is essential to prevent occupational health and safety hazards. Currently, healthcare waste generated in Bhutan is documented on a daily basis. Each outreach clinic, primary health center, and hospital submits an annual waste report to the District Health Officer or Chief Medical Officers. This report details the quantity of waste generated, the adopted disposal methods, and challenges faced in implementation.
56. The ongoing development of an electronic Patient Information System (e-PIS) is operational in National Referral Hospital and by 2025, most of the hospitals will also adopt it. Subsequently, a quarterly waste report module is expected to be implemented.

EXISTING CAPACITY FOR BIOMEDICAL WASTE MANAGEMENT

Distribution of Common Biomedical Waste Treatment and Disposal Facilities

57. The common biomedical waste treatment and disposal facilities are very crucial for the proper management of medical waste from the safeguard point of view. However, Bhutan only has only three medical waste treatment facilities at Thimphu, Mongar and Phuentsholing. The capacities of the incinerators are as follows, with the combined capacity for the three-treatment facilities around 730 tons/year.

- Thimphu 2 Number (100kg and 300kg)
- Mongar 1 Number (300kg)
- Phuentsholing 1 Number (100kg)

58. Based on the survey of five sample healthcare facilities all facilities seem to have adequate capacity to handle waste generated from this project. Facilities like waste autoclaves, deep burial pits and waste storage facilities are available with manpower. The existing incinerators if required can also be utilized. Trained people are available at the health facilities to manage waste, but it was observed and as stated by themselves, they still need more training for efficiency and effectiveness.

Conclusion:

59. With the existing CBWT and disposal facilities in addition to the deep burial pits and waste storage constructed under the HSDP, it is being concluded that the waste generated from the procurement of medical equipment and supplies under the proposed project can be managed and treated in an environmentally safe manner. As most of the waste is general waste it will be segregated and disposed at the site of origin, and where necessary, other infectious and hazardous waste will be disposed as per the existing guidelines.

60. All electronic waste including medical equipment will be handed over to the Department of National Property as per the existing regulation.

61. Although there is a focal at each healthcare center to manage waste, some of them feel they still need more training to manage waste more efficiently and effectively.

Overall improvement requirements:

Based on the due diligence certain areas are identified that need to be strengthened as follows in the long run for overall improvement of the health management services by RGoB.

62. The practice of open-pit burning for nonhazardous waste in remote areas still continues, so the same needs to be discouraged. NMS will need constant monitoring and building of new waste management infrastructures and distributing waste treatment/ management equipment as required.

63. The waste data from health facilities are provided by the facilities and collated only once a year. It will be helpful to have real time or at least quarterly generation of data that can be achieved with the help of eBhutan Medical Supply Inventory System (e-BMSIS)
64. Comprehensive and regular training programs for medical waste management should be instituted at all healthcare facilities (HCFs) with proper reporting on medical waste enhanced through online/ offline platforms.
65. To ensure proper segregation of Biomedical Waste (BMW) in Bhutan, a behavior change communication initiative is recommended for healthcare staff, emphasizing the correct use of color-coded bins.
66. Prepare inventory of infrastructure and equipment required at any healthcare facility (possible through eBMSIS) and NMS can provide/construct such equipment/ infrastructure in a phased manner under various schemes to cater to biomedical waste generation, treatment and disposal as per rules.

Recommendations specific to the Project:

Recommendations as follows need to be compiled by NMS, MoH during the implementation of this Project.

67. Compliance of MoH undertaking regarding supply of equipment only to the facilities having environmental preparedness with respect to bio-medical waste management and occupation and community health safety (template in Annexure -3) needs to be reported in quarterly progress reports for recipient facilities.
68. Quantitative status on bio medical waste handling capacity, generation and management (treatment and disposal) of recipient HCFs to be reported annually and incorporated in the quarterly progress report once mWaste system is functional
69. Status on occupational and community health safety (surrounding environment), if any due to mismanagement of biomedical waste of the recipient HCFs to be incorporated in the quarterly progress report.
70. Status on capacity building activities regarding BMW, health and safety, if any at the recipient facilities to be incorporated in the QPR
71. Status on grievances received if any for the Project with respect to environment, health and safety to be incorporated in the QPR

Annexure-3: Template for ensuring environmental safeguards preparedness for recipient facilities – to be used during monitoring

A. Health Facility Information

Facility Type (National level/ dzongkhag level/ Local level)	
Location	
District/State	
Bedded (yes/ No)	
No. of Beds	
Operation Theatre (yes/no)	
In-patient facility (yes/No)	
Nearest CBMWTF (location and distance)	
Does the facility have requisites environmental clearances in place such as ECC etc.	
Is the facility under Health Sector Development Program of ADB	

B. Waste generation and management

S.n	Particulars (Attach supporting documents)	Yes	No	Details/Remarks/corrective action proposed or taken
I.	Existing Infrastructure			
1	Does the facility have a well-defined system for segregating different types of waste such as general waste, hazardous medical waste, recyclables, and electronic waste (e-waste) ?			
2	Capacity of the temporary waste storage vs the quantity of different types of wastes generated.			
3	Does the facility have well defined system to disinfect the waste?			
4	Does the facility treat the wastes in-situ or are transported to a CBMWTF			
5	Are the storage areas for waste materials secure, well-ventilated, and designed to prevent contamination or leakage?			
6	Are the waste containers labeled appropriately, color-coded, and in good condition ?			
7	What is the level of preparedness of the facility to handle/manage the hazardous waste? Are the hazardous waste containers clearly marked with hazard symbols and contents ?			

8	Do the staff members follow proper procedures when handling and disposing of waste, including wearing appropriate personal protective equipment (PPE) ?			
9	Does the facility has on-site medical waste treatment facilities such as autoclaves or incinerators or deep burial pit, etc. ?			
10	Are the medical waste treatment conducted in compliance with national guideline/regulations?			
11	If wastes are transported to other location for treatment, do they have trained waste haulers for safe transportation of medical waste?			
12	Are the transportation records maintained?			
13	Do the health care facilities have recycling programs for items like paper, plastics and glass etc. ?			
14	Is there procedure to handle, store and dispose electronic waste (e-waste) or what is the level of preparedness of the facility to handle/manage the e-waste			
15	Does the facility have an effluent treatment plant? If yes, their generation quantity and ETP capacity. If not, how is the liquid waste after disinfection disposed/ managed			
16	Does the facility have a sewage treatment plant? If yes, their generation quantity and STP capacity. If not, how is the sewage disposed/ managed			
17	Are records related to waste management maintained and available?			
18	Are records kept in compliance with guideline/regulatory requirements?			
19	Are the qualification/ experience or capacity of the staffs handling waste adequate?			
20	Are the staff trained on waste management practices including proper disposal of different waste categories?			
21	Does the facility has a contingency plan in place to respond to spills/ mercury spills or accidents involving hazardous waste.?			

22	Does the facilities have storage and handling of chemicals, including pharmaceuticals and cleaning agents, to prevent spills and contamination.?			
II.	Facility Preparedness			
23	Type and quantity of the equipment to be supplied to the facility under reprogramming of Loan. Please divide them by replacement, addition, new to the facility (fill details in table A).			
24	Please account for the total BMW incremental if any annually (until quarterly waste reporting system under mWaste is functional) and if the existing capacity of the facility is enough to manage it.			
26	Are any of the equipment likely to generate waste with radioactive traces.			
27	If yes, what is the level of preparedness of the facility to handle / manage the radioactive waste			
28	Are there deep burial pits in the facility			
29	If yes, is the design of deep burial following national/ WHO/ IFC standard?			

C. Impact on surrounding Environment and Community

S. n	Questions	Yes	No	Details, if any
1	Any waste dumped on unpaved surface			
2	Any sign of waste leeching into ground			
3	Any liquid waste getting discharged into water body			
4	Are the deep burial pits lined and covered			
5	Waste dumps accessible to stray animals			
6	Waste dumps accessible to street children/ public			
7	Any concern raised by surrounding community on BMW management			
8	Any report of infection spreading in nearby community			
9	Any report of water extracted from surrounding tubewell/ hand pump getting contaminated			
10	Distance of waterbodies, ground water sources from deep burial pits, waste storage locations, waste treatment facilities			
11	Distance of any other environmentally sensitive features from the deep burial pits, waste storage locations, waste treatment facilities			

	Table-A Facility Preparedness									
Equipment	Quantity of equipment	Receiving HCF	Type of waste likely to be generated ¹	Frequency of waste generation	Quantity of waste generation (per unit), if available	Replacement of Equipment	Addition of equipment	New equipment	Existing capacity to handle the additional waste	Existing capacity of the facility staff to handle /use the equipment safely ²

Any other Observation/ data related to environmental safeguards may please be incorporated with details and supporting documents/ photos.

Corrective Actions, if any suggested / discussed with facility staff

¹ e-waste/ waste with radioactive traces /biomedical (sharps/anatomical/cotton swabs/infected liquid)/ hazardous/ biodegradable/ non-hazardous recyclable (glass/plastic etc), inert waste etc

² To avoid occupational health safety implication to staff that might occur due to mis handling or equipment by untrained staff.