KINGDOM OF CAMBODIA

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MINISTRY OF HEALTH

Health Equity and Quality Improvement Project (H-EQIP) and COVID-19 Emergency Response Project

ENVIRONMENTAL AND SOCIAL MANANGEMENT PLAN

for

CONSTRUCTION/RENOVATION OF LABORATORIES IN NATIONAL INSTITUTE OF PUBLIC HEALTH

May 23, 2022

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LIST OF ABBREVIATION

BSC	Bio-Safety Cabinet
BSL3	Bio-Safety Level 3
CEMP	Contractor Environmental Management Plan
CERC	Contingent Emergency Response Component
EDC	Electric Du Cambodge
ESCOP	Environmental and Social Code of Practice
ESMF	Environmental and Social Management Framework
GBV	Gender-Based Violence
GRM	Grievance Redress Mechanism
H-EQIP	Health, Equity and Quality Improvement Project
HEPA	High-Efficiency Particulate Air
HVAC	Heating, Ventilation and Air-Conditioning
ISO	International Standard Organization
LMP	Labor Management Plan
MOH	Ministry of Health
NIPH	National Institute of Public Health
NPHL	National Public Health Laboratory
OHS	Occupational Health and Safety
OPD	Out-patient Department
PMD	Preventive Medicine Department
PPE	Personal Protective Equipment
PPWSA	Phnom Penh Water Supply Authority
RGC	Royal Government of Cambodia
SOP	Standard Operation Procedure
WHO	World Health Organization

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1. PROJECT DESCRIPTION

The Royal Government of Cambodia (RGC) received funding from the International Development Association for the Cambodia Health Equity and Quality Improvement Project (H-EQIP) and the COVID-19 Emergency Response Project.

The objective of the H-EQIP project is to improve access to quality health services for the targeted population groups with protection against impoverishment due to the cost of health services in the Kingdom of Cambodia, and to provide immediate and effective response in case of an eligible crisis or emergency. The project has 4 components namely: Component 1: Strengthening Health Service Delivery, Component 2: Improving Financial Protection and Equity, Component 3: Ensuring Sustainable and Responsive Health Systems, and Component 4: Contingent Emergency Response Component (CERC). CERC, with a provisional zero allocation, was created to allow for the reallocation of financing in accordance with the IDA Immediate Response Mechanism to provide an immediate response to an eligible crisis or emergency, as needed. Upon the request from RGC, CERC has been activated on March 27, 2020 and US$14 million was reallocated from other project component budget to finance the implementation of Cambodia National Action Plan for Responding to COVID-19. Action plan prepared to be financed when activating CERC includes supplies of laboratory equipment and reagents, medical equipment and consumables, construction/renovation of hospital and laboratory buildings for testing and treating COVID-19, and ambulances.

As a direct response COVID-19, the COVID-19 Emergency Response Project is developed to assist the Royal Government of Cambodia (RGC) in its efforts to prevent, detect and respond to the threat posed by COVID-19 and strengthen national systems for public health preparedness. The activities are designed to support selected containment and vaccination as well as mitigation related activities which the RGC has identified in the COVID-19 Master Plan and National COVID-19 Vaccine Deployment Plan. The project has 4 components. Component 1: Emergency COVID-19 Prevention and Response including: (i) case detection and management: establishing and upgrading laboratory, isolation and treatment centers, equipping medical supplies, furniture, and network installation. This includes upgrading NIPH's laboratories, building diagnostic capacity of the four provincial laboratories as well as laboratories attached to the 21 provincial referral hospitals; and upgrading isolation and treatment centers in all 25 municipal/provincial referral hospitals; and (ii) deployment of COVID-19 vaccination include provision of cold chain, logistic and medical consumable for the vaccine deployment. Other three components include component 2: medical supplies and equipment: procurement of supplies and equipment needed for activities outlined in the COVID-19 Master Plan; component 3: preparedness, capacity building and training: activities related to preparedness, capacity building and training, guided by the different pillars and activities of the COVID-19 Master Plan; and component 4: project implementation and monitoring including

support for procurement, financial management, environmental and social safeguards, monitoring and evaluation, and reporting.

In responding to COVID-19, the National Public Health Laboratory (NPHL) has been deployed as the national laboratory to provide COVID-19 testing for suspected and investigated cases. Under the H-EQIP CERC action plan and the component 1 of COVID-19 ERP, MOH planned to upgrade/renovate NPHL by establishing BSL2+ and BSL3 laboratories, equipping them with sophisticated laboratory equipment and their associated equipment, consumables, and reagents. Upon the arrival of some procured equipment and machine, National Institute of Public Health will immediately start its laboratory upgrading and construction/renovation activities.

1.1 Description of Project Site

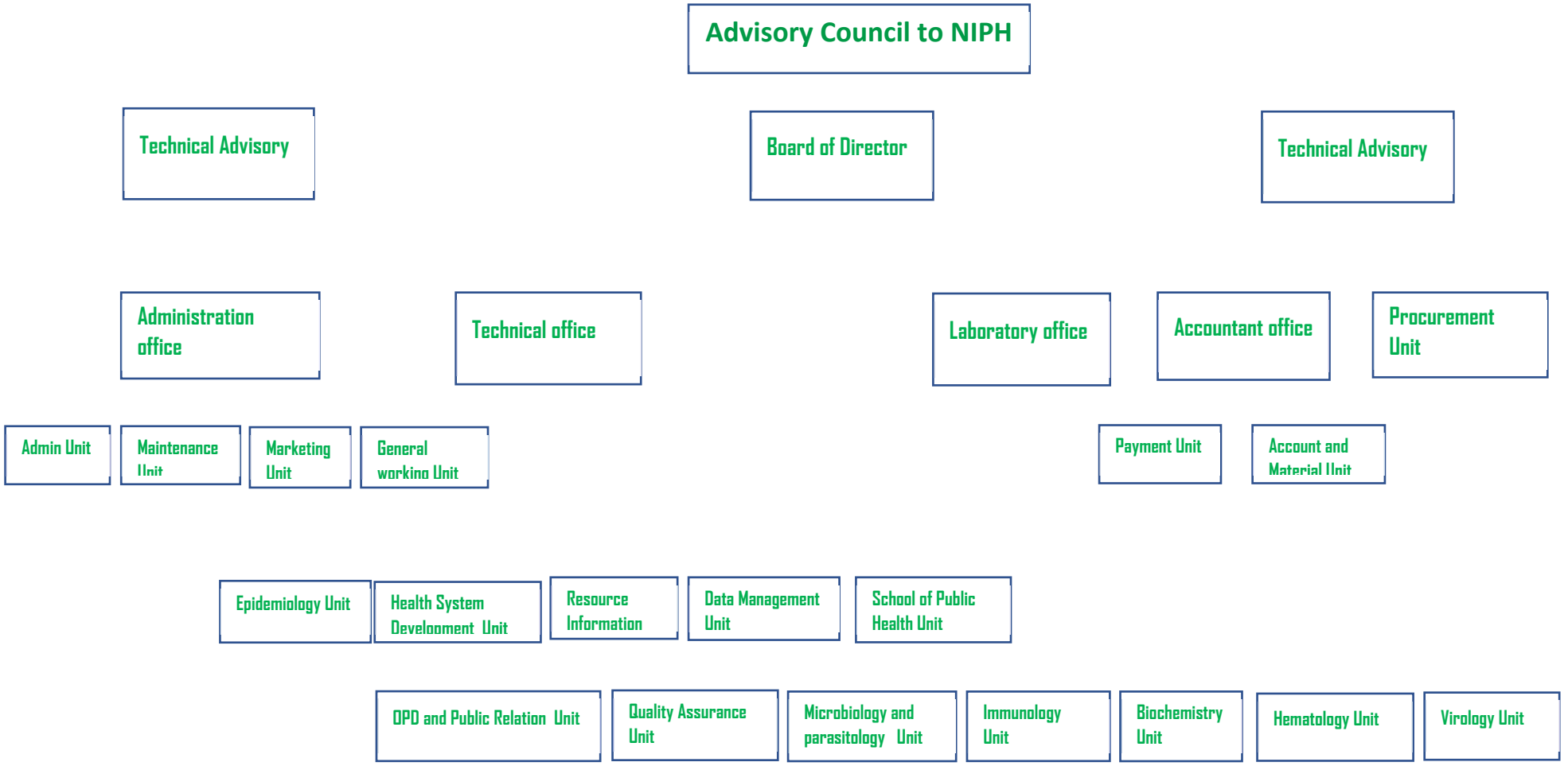
1.1.1 National Institute of Public Health

NIPH and its NPHL, known as a national reference laboratory, are working on promoting and strengthening laboratory quality service for public health. With highly qualified and experienced technical staff, NPHL offers high quality services at a reasonable price. Laboratory results used particularly for diagnosis of diseases, are ensured through the up-to-date technologies and the use of Laboratory Quality Management System (LQMS).

1.1.1.1 The Organizational Structure of NIPH

NIPH was established in 1997 in Phnom Penh, Cambodia, as a successor to the National Center for Hygiene and Epidemiology. NIPH has become a semi-autonomous public institute (or a public administrative establishment) since 2007. Its management structure is governed by a board of directors and chaired by the Minister of Health. Technically, NIPH is accountable to the Ministry of Health, and financially, is accountable to the Ministry of Economy and Finance. NIPH is composed of a Technical Office, a NPHL, and two supporting offices, the Administrative Office and the Accounting Office. The Technical Office includes a number of health research units and a School of Public Health (SPH) that offers postgraduate degrees in public health. NPHL also has a number of units, including laboratory outpatient service unit. NIPH organizational chart is presented below.

Figure 1: Organizational chart of NIPH



Source: NIPH (2020)

1.1.1.2 NIPH's Human Resources

There are 118 staff in NIPH. These staff are divided into three groups, government staff (73), government contract staff (20), and contract staff (25). 54 staff out of total 118 work for Laboratory Bureau.

1.1.1.3 NIPH's Services

NIPH provides three types of services including:

(i) public health laboratory services, including serving as a national public health reference laboratory;

(ii) public health training, including Master of Public Health and Master of Science programs in Epidemiology, Nutrition, Hospital Administration, and Health and Community Development; and

(iii) health research and policy support through improving evidence-informed health policy.

1.1.1.4 Strategic Plan Related to NIPH's Laboratory Service

One of the four goals of the current NIPH strategic plan 2020-25 is to make NIPH to become a well-known National Public Health Reference Laboratory, providing standard quality public health laboratory services, laboratory training and research, and support in quality improvement, disease surveillance and outbreak investigation. This goal is attended through these strategic objectives and implementations:

- Promote public recognition on laboratory services provided by NPHL through establishing a responsive marketing system
- Support public and private laboratories toward ISO accreditation through LQMS and other short course training programs
- Strengthen NPHL resources to develop and expand External Quality Assurance program to public and private laboratories
- Maintain and expand NPHL service implementation according to ISO 15189 and other accreditations
- Promote NPHL equipment calibration services to public and private laboratories
- Maintain surveillance system and outbreak investigation and response
- Enhance research capacities and activities in NPHL

1.1.2 Location and Site Condition of NIPH

NIPH is located at Lot#: 80, 289, Samdach Penn Nuth Blvd., Phnom Penh, Cambodia. The Institute's location is in the center of Phnom Penh, bordered with Toul Kork Primary School and Street 566 at the North, with the Ministry Of Health (MOH) and Samdach Penn Nuth Blvd. at the East, with street 614 and residential shops at the South, and with street 291 and residential houses/shops at the West. The area size of NIPH is 15,325m^2. NIPH is located in the same compound with MOH.

1.1.3 The Ground Level and Drainage Status

NIPH compound is surrounded by streets and underground public wastewater and stormwater drainage system. NIPH's drainage is connected to the main drainage system of MOH before discharging into the public drainage system. The ground level of NIPH premises is a bit lower than the front and rear buildings and surrounding area. However, NIPH premises never encounter problem related to stormwater flood even during intense rainfall.

1.1.4 Water Supply

The NIPH is connected with the Phnom Penh Water Supply Authority (PPWSA) for domestic water supply. Water intake into laboratories is connected directly from the PPWSA water pipe through two pressure pumps. Water supply provides good quality water and its service is adequate and regular. But sometimes the pressure is low that need to use the pressure pumps to support the need. To secure the availability of water every time, two standby water tanks with 10^3 each have been installed to store water in case of accidental water supply cut off.

1.1.5 Electric Power Supply

NIPH is connected with the Electricité Du Cambodge (EDC) power supply lines. The electricity input has enough capacity to supply power to all laboratories in NIPH. In addition, NIPH has three standby generators with the capacity of 100KVa, 200KVa and 800KVa to backup power in case the failure from the EDC line. In the laboratory and server room, the UPS backup is installed to secure power sources for about 30 minutes when the power supply is cut off. Small testing machine in micro laboratories is connected to an individual UPS while larger machines in macro laboratories are connected to central UPS.

1.1.6 Wastewater Collection and Treatment

Wastewater generation in laboratory building is collected from all laboratory facilities to the septic tanks of laboratory building and then to the public wastewater system. No wastewater treatment facility has been installed in laboratory. Wastewater treatment in laboratory is done manually at source. All wastewater collected from analyzer/testing machines, laboratory equipment, and from cleaning contaminated reuse laboratory materials have been collected separately at source and stored in transparent PVC containers of 2L, 5L, 10L, and 20L volumes for treatment (sterilization/disinfection) at source. The existing treatment/disinfection process is practiced manually with bleach solution. Bleach is added into collected infectious wastewater at concentration of 0.5% and kept for a period of time from 30 minutes to overnight depending on the level of infectious wastewater concentration. After bleach treatment/disinfection process, treated wastewater is poured into the sinks in the laboratories to discharge into wastewater pipe of the building and then to the public wastewater. Figure 2 below indicates infectious wastewater treatment process in NIPH laboratories.

Figure 2: wastewater treatment process in NIPH laboratories

1- Bleach to be added into infectious wastewater;
2- Reuse laboratory materials to be sterilized/decontaminated in bleach solution;
3- Infectious wastewater collected from testing machines;
4- Infectious wastewater collected from test samples, blood and body fluids;
5- Sinks in laboratory to discharge treated infectious wastewater;
6- Wastewater from sinks discharge into wastewater pipe of laboratory building.

biological agents including bacteria and viruses. Virology lab, Out-Patient Department (OPD) lab, and Micro lab (bacteria culture lab) of NIPH use bleach solution for disinfection generated wastewater, cleaning spillage, and sweeping floor. The bleach treated wastewater from micro laboratory (bacteria culture lab) used to test quality of treated wastewater by doing bacteria culture. The treatment follows the SoP. NIPH have never checked the bacteria after treatment before the water is discharged into wastewater system of laboratory building. In the future, there should have waste water testing after treatment.

1.1.7 Solid Waste Collection and Treatment

Laboratory solid wastes at NIPH have been generated from four sources including Out-Patient Department (OPD) Lab and Office, Micro Lab and Office, Virology Lab and Office, and COVID certificate and passengers. NIPH separates laboratory wastes at source into three types: general waste, infectious waste, and sharp waste. Daily waste generation quantity is estimated at about 80kg for general waste, 80kg for infectious waste and 5kg for sharp waste. However, waste quantity would be increased significantly if an outbreak event of COVID-19 occurred and COVID-19 sample collection wastes from the assigned sites were also collected to treat in central autoclave of NIPH.

Three types of separated bins with different colors and logos have been designed for waste collection. They are green bin for general waste, red bin for infectious waste, and yellow bin/box for sharp waste. For internal infectious waste collection in NIPH laboratories, red plastic bag is

used to empty infectious waste from smaller bins that are placed at designated location in laboratory room. Full bags are properly tied and put in larger infectious waste bin for carrying to put in central autoclave room of NIPH for sterilization process before they are stored in infectious waste storage room waiting for Red Cross's truck to collect them. The red bag is designed with a printed infectious waste logo outside and indicated safety area where it is safe to touch or carry for collection. Figure 3 presents flow of infectious waste in NIPH laboratories.

There are two types of waste collection services that NIPH is using: general waste collection service and infectious waste collection service. General waste generated in laboratory building including domestic and office wastes are collected and stored in a designated location inside the NIPH compound for a daily collection from CINTRI , the city domestic waste collection company, for final disposal at municipality dumpsite. Infectious waste and sharp waste are collected by the Red Cross's truck every Wednesday and Friday for final incineration by Red Cross's incinerator.

Figure 3: Infectious waste flow in NIPH laboratories

1- Infectious waste bin placed nearby source of generation
2- Infectious waste bin placed at designated area in laboratory
3- Yellow box for dropping sharp waste
4- Mini autoclave for decontamination of infected waste and reuse laboratory materials;
5- Separated infectious waste bin and general waste bin placed at designated area in laboratory room
6- Larger separated waste bins inside laboratory room for carrying out to large waste bin;
7- Large infectious waste bin (trolley) outside laboratory room for temporary storage and transport infectious waste to central autoclave facility
8- Central autoclave facility/room
9- and 10: Central infectious waste storage facility/room-infected waste in central storage room

Infectious waste and sharp waste are collected separately and separated from the general waste.

Both types of wastes are put into infectious waste bin and sharp waste bin that are placed at assigned location nearby sources of generation. Then these wastes are collected by putting in red plastic bag for sterilization/decontamination process in central autoclave prior to storing in infected waste storage room of NIPH for final collection by Red Cross truck for final incineration.

Contaminated reuse laboratory materials are disinfected in 0.5% bleach solution and then sterilized in mini-autoclave for reuse. After completing the process of decontamination and sterilization, treated materials are validated with monitor spore ampoule to make sure that they are completely sterilized for reuse.

1.1.8 Surrounding Natural Environment and Social Conditions

NIPH is located at the center of Phnom Penh, a crowded residential and commercial zone. NIPH compound is surrounded by streets and main street at all directions. Its compound is occupied by several buildings including MOH buildings, NIPH institute building, and NPHL building, and parking spaces. This condition makes the compound of NIPH a bit narrow.

Figure 4: Location of NIPH, surrounding communities, and NIPH buildings

NIPH buildings: 1: NIPH main building and virology lab, 2: OPD lab, 3: micro laboratories, 4: central autoclave room, infectious waste storage room, and laboratory clothes laundry room, 5: NIPH institute building.

Figure 5: NIPH compound with crowded vehicles

NIPH compound is next to the Toul Kork public primary school in the North. It is also surrounded by residential houses, shops, restaurants, business buildings, markets, and street food vendors in the South, West, and North. NIPH compound is detached from surrounded communities by concrete fences of about 3 meters high. There are four access gates, three from the main street 289 and another from street 566, the entrance of NPHL.

There are some big trees at the front and back sides of NIPH compound. There is no historical place, temple, or community spirit house located near NIPH compound.

1.2 Project Size and Main Activities

1.2.1 BSL2+ Laboratory under H-EQIP Project

a) Sub-project Cost

Approximated cost of sub-project (i.e. construction/renovation of NIPH laboratories) is estimated at approximately US$375.390,50. The cost for the civil work is about US$160.493 and US$210.897,5 for Mechanical, Electrical and Plumbing works. The cost is included tax 10%.

b) Main Activities

The establishment of this new Bio Safety Level (BSL) 2+ laboratory room consists of two main parts. The first part is the construction/renovation of new laboratory room focusing on civil work/construction work. The second part is the provision of laboratory equipment.

Construction/renovation of BSL2+ laboratory: The project will finance the construction/renovation of laboratories within the existing laboratory building. The current BSL2+ laboratory room at NPHL located at the first floor of NIPH main building does not have enough space to accommodate the new analyzer (PCR machine - COBAS 6800 System). Therefore, the construction/renovation of laboratory facility aims at making an additional BSL2+ room in order to expand testing capacity of NPHL up to approximately 600 SARS-CoV-2 testing per day. This new laboratory room is located at the ground floor of NIPH main building.

Construction/renovation Below are construction/renovation activities/works financed by the project:

Preliminary works: Design drawing, mobilization and site installation including site clearance, access road, safety signs, fencing and workers' accommodation with sanitary facility and provision of water & electrical supply to work site, debris transportation.

Structural works: None

Civil works: Removing of existing floor tile, brick wall, painting, repainting on wall, install new brick wall including plastering and painting, apply epoxy on floor, install ceiling board, doors & windows.

Electrical works: Distribution board, lighting fixture, wiring device, Low Voltage cable, cable trunking, Digital Light Pressing trunking, conduit and fittings.

Plumbing works: Water supply system and wastewater pipe system connecting to the existing system

Site works: Site clearance and preparation

Fire fighting works: Fire fighting system

Other works: Extra Low Voltage system and Battery Management System

The construction/renovation of room will take about 2.5 months to complete. For more detailed drawing (civil work & Mechanical Electrical Plumbing work) of construction/renovation work, please see Annex 1.

1.2.2 Provision of Laboratory Equipment

Below is a list of laboratory equipment and supplies for NIPH financed by H-EQIP-CERC

Table 1: Laboratory Equipment, Materials, and Supplies Financed by H-EQIP-CERC

No	Description of Items	Unit items	Quantity
1	Freezer for NIPH (-80degree/480 litter) Brand: Qingdao Haier/ DW-86L486E (-86 oC) (486 L)	Unit	3
2	Reagents for rRT-PCR: QIAamp Viral RNA mini Kit (Kit/250 tests)	Kit/250test	50
3	Reagents for rRT-PCR: Invitrogen, SuperScript™III Platinum® One-Step Quantitative RT-PCR(Kit/500 tests)	Kit/500tests	30
4	Reagents for rRT-PCR: Primers/probe berlin (Pack/96 tests)	Pack/96test	100
5	PCR machine - COBAS 6800 System	Unit	1
6	Reagents for rRT-PCR	Unit	10,000
7	Filter Tips sterile 0.1 to 10µl (ART) pack of 10 x 96	Pack of 960	40
8	Filter Tips sterile 2 to 200 µl (ART) pack of 10 x 96	Pack of 960	40
9	Filter Tips sterile 100 to 1000 µl (ART) pack of 10 x 96	Pack of 960	20
10	Biological Safety Cabinet Class II A2 Brand: Qingdao Haier/HR1500-IIA2 (dimension: 1,680mm X 845mm X 2,160mm)	Unit	1
11	Eppendorf Microcentrifuge 5420 GLP with rotor 24 x 2	Unit	3
12	Chemical indicator tape for autoclave	Unit	1,000
13	Specimen packaging material, (Ice Pack and cooler box)	Unit	300

14	Screw Cap Microcentrifuge Tubes with "O" rings SCT-150-C-S 1.5 ml clear, sterile.	Pack/4000	4
15	Screw Cap Microcentrifuge Tubes with "O" rings SCT-200-C-S 2.0 ml clear, sterile.	Pack/500	60
16	PCR tube strips, clear, with 8-wells and separate strip caps	10xpack/125	20
17	Strip flat caps for 8-wells, 0.2ml PCR tube strips	10xpack/125	
18	Locking Microcentrifuge Tubes, sterile tube	Box/1000	10
19	100-well Microtube storage Boxes 1.5ml to 2.0ml (Blue and Red), split color in half	Pack/5	70
20	Nitrile Exam Gloves (M & L size), case/1000	Box/1000	20
21	Laboratory Marker II, Fine Point (Black and Red), split colors in half	Pack/4	30
22	Parafilm	Roll	34
23	Swab plain aluminum alginate tip sterile Cat: 710-0184	Box/100pcs	50
	MOH local procurement		
1	Universal Viral Transport kits with swabs, box of 50 (confirm for VTM Inactivate) = 25,000 tubes	Tube	25000
2	ANIOS MANUGEL 85	Bottle/500ml	90
3	Anios clean Excel D	Bottle/5 L	30
4	ANIOSPRAY SURF 29	Bottle/5 L	30
5	Surfa'Safe premium	Bottle/750 ml	30
6	WIP'ANIOS PREMIUM = 60 Packs (Pack/100 wipes)	Pack/100wipes	60
7	Refrigerators for NIPH = 2 Units	Unit	2
8	Aircon 5HP (3 units), 2HP (2 units) for NIPH = 5 Units	Unit	5
9	UPS backup, 3 units for NIPH = 3 Units	Unit	3
10	Laptop = 2 units and desktop = 2 units and external hard disk = 2 units for NIPH	set	2
11	Nitrile Exam Gloves (M & L size), case/1000 = 60 Boxes (Box/1000)	Box/1000	120

1.2.3 BSL3 under laboratory under COVID-19 Emergency Response Project

This BSL3 establishment responds to component 1 on case detection and management of the COVID-19 ERP. It upgrades capacity of NIPH laboratory service to be able to test for COVID-19 much faster and quantified samples per day. Main activities are construction of building for this BSL3, installment of laboratory, and operation. Below details civil work for construction of building.

a) Sub-project cost:

Approximated cost of sub-project (i.e. construction/renovation of NIPH laboratories) is estimated at approximately US$1,817,881.58 which include the cost for the civil work, for Mechanical, for Electrical and Plumbing works. The cost is included tax 10%. In addition, approximately US$ 1,584,539 include the cost of BSL3 set up and laboratory equipment.

b) Main activities:

The establishment of this new Bio Safety Level (BSL) 3 laboratory room consists of two main parts. The first part is the construction/renovation of new laboratory room focusing on civil work/construction work. The second part is the provision of laboratory equipment.

Construction/renovation of BSL3 laboratory: The project will finance the construction/renovation of laboratories within the existing laboratory building. The future used of BSL3 laboratory is to culture and to harvest the virus pathogen for further testing. Therefore, the construction/renovation of laboratory facility aims at making an additional BSL3 room in order to expand testing capacity of NPHL on virology activities. This new laboratory room is located at the first floor of NIPH main building.

Construction/renovation:

Construction/renovation Below are construction/renovation activities/works financed by the project:

Preliminary works: Design drawing, mobilization and site installation including site clearance, access road, safety signs, fencing and workers' accommodation with sanitary facility and provision of water & electrical supply to work site, debris transportation.

Civil works: Foundation, excavation and compaction, concrete, removing/installation of existing floor tile, brick wall, painting, repainting on wall, apply epoxy on floor, installation of ceiling board, doors & windows, roof, steel structure and framing, etc.

Electrical and Mechanical works: Distribution board, lighting fixture, wiring device, air conditioning and ventilation, Low Voltage cable, cable trunking, Digital Light Pressing trunking, conduit and fittings.

Plumbing works: Water supply system and wastewater pipe system connecting to the existing system

Site works: Site clearance and preparation

Firefighting works: Firefighting system

Other works: The installation of lift, negative pressure system and Effluent Treatment Plant (ETP). Provision for CO_2 gas supply into BSL3 facility.

The construction/renovation of room will take about 10 months to complete. For more detailed drawing (civil work & Mechanical Electrical Plumbing work) of construction/renovation work, please see Annex 1.

Civil work for this new established laboratory includes:

a. Rehabilitation of existing building BSL2+ (A building). The renovation will be carried out without touching the BSL2+ room. The activities for this renovation including:

removing work and reinstall of floor tile, painting, doors and windows, some brick wall, and additional decoration for windows, steel works, and security post guard.

b. Construction of a new story building of 3 story with size 4.5m x 40m located in the middle of building A and building B. The activities for this new building including: foundation work, civil works (concrete, masonry, plastering, painting, tiling, ceiling, decoration, steel structure and framing, epoxy, doors and windows, roofing, etc.), MEP works (mechanical, electrical, plumbing, drainage, sewage, firefighting system, air and ventilation, etc.).
c. Rehabilitation of existing building storage of 2 story and new extend of 2 story size 9.20m x 40m. The activities for the rehabilitation including: foundation work, civil works (concrete, masonry, plastering, painting, tiling, ceiling, decoration, steel structure and framing, epoxy, doors and windows, roofing, etc.), MEP works (mechanical, electrical, plumbing, drainage, sewage, firefighting system, air and ventilation, etc.).
d. Other works such as the installation of lift, negative pressure system and Effluent Treatment Plant (ETP).

Existing Building

Proposed new Design

1.2.4 **Provision of Laboratory Equipment**

No	Equipment/ Materials	Unit	Quantity	Description
Ground Floor				
1. Freezer farm				
1	Freezer (-80 degree)	Unit	10	(-80 degree/480litter)
2	Thermometer	Unit	2	Digital Temperature and Humidity
2. Office Open Space Mobile Partition Block by Part				
3. Research Room				
1	Mobile table (Can be install by project base)	Unit	2	
2	Rolling Chaire	Unit	10	
5	Benchtop	Unit	1	
4. Storage Lab				
5. Storage NIPH				
1	Refrigerator	Unit	3	
First Floor				
6. Office Open Space Mobile Partition Block by Part				
7. Server room				
1	Shelves	Set	2	50cm*200cm*4 layers
8. BSL3				
A. Changing Room (1)				

1	Acess Control	Set	1	
2	Storage cupboard	Set	1	12 door
B. Storage room for BSL3 (2)				
C. Anteroom (3)				
1	Monitor for Pressure	Set	1	
2	Storage cupboard	Set	1	12 door
D. BSL3 (4)				
1	Biology Safety Cabinet	Unit	2	
2	Autoclave 50 or 85L?	Unit	1	
3	Medical freezer (-20 degree)	Unit	2	
4	Freezer (-80 degree)	Unit	2	
5	Votex/Mixtor	Unit	1	
6	Anarobic candle jar	Unit	1	
7	Incubator	Unit	2	(1 x O2 and 1 x CO2)
8	Inverted microscope	Unit	1	
9	Confocal microscope	Unit	1	
10	Water bath (សំរាប់រំលាយសំណាកដែលកក)	Unit	1	
11	Sink	Set	1	
12	Heating block	Set	1	
13	Hand washing station	Set	1	
14	Stainless steel bench with storage under	Set		
15	UPS system	Set		

16	Emergency shower	Set	1	
17	Eye wash station	Set	1	
18	Centrifuge	Unit	2	Refrigerator Centrifuge (conical tube and micro centrifuge tube). Hold up to 50ml centrifuge tubes and plates
19	Microfuge	Unit	2	
20	Computer	Set	2	
21	Refrigerator	Unit	2	
22	Pipettes (10ul, 100ul, 1000ul)	Set	2	
23	Multi-dispenser pipette	Set	2	
24	Multi-channel pipette (8-channel)	Set	2	
25	Liquid nitrogen (N2) freezer or cryostorage container	Unit	1	
26	Aspiration pump (peristaltic or vacuum)	Set	1	
27	pH meter	Unit	1	
28	Waste containers	Unit	1	
29	Roller racks	Unit	1	(for scaling up monolayer cultures)
30	Flow cytometer	Unit	1	
31	Cell culture vessels	Unit		(e.g., flasks, Petri dishes, roller bottles, multiwell plates)
32	Syringes and needles	Unit	1	

33	Cell counter	Unit	1	Countess II FL Automated Cell Counter or hemacytometer
34	EG bioreactors	Unit	1	
9. Serology for Virology Room				
1	Benchtop	Set	1	
10. EQA Program Room				
1	Biology Safety Cabinet	Unit	1	
2	Fridge	Unit	1	
3	Refrigerator	Unit	1	
4	Benchtop	Unit	1	
5	Analyzer Mobile	Unit	2	
11. Autoclave room				
1	Autoclave 150ml	Unit	2	
2	Over Dry	Unit	1	
12. Toxicology Room and Gene Xpert room				
Second Floor				
13. Office Area				
14. Staff Break Room				
1	Table	Unit	1	
2	Refrigerator	Unit	1	
3	Cupboard	Unit	1	
15. Office Area				
16. Open Space office				
17. Document Storage Area				

18. Storage Area				
1	Cupboard	Unit	1	12 door
19. Open Space Office				
Third Floor				
20. Storage				
21. Conference Hall				
Theatre seat/mobile seat		Unit	120	
Mobile table		Unit	3	8cm*150cm
22. Meeting and Training Room				
Meeting desk and arm chairs		Set	1	For 40 people
Other				
1	Generator and electric supply	Set	1	300 KVA

2. POTENTIAL ENVIRONMENT AND SOCIAL RISKS AND IMPACTS

2.1 Potential Environmental and Social Risks and Impacts in the design phase

Without proper design of laboratory, construction/renovation, life and fire safety measures and basic environmental hygiene facilities (hand washing facilities, toilets and waste disposal facility) may be neglected.

For a new established BSL2+ and BSL3 laboratory rooms: Inappropriate design including design features of laboratory would create greater issues on biosafety, biosecurity, health safety issues for laboratory staff, workers, and community as a whole. Similarly, improper construction design for laboratory waste management (infectious and hazardous wastes) would create risk of lab operators and workers to exposure during operation. Inappropriate siting of laboratory equipment and machines would generate risk that results in greater exposure of laboratory operators to infectious aerosols and splashes when manipulating materials containing infectious agents such as primary cultures, stocks, and diagnostic specimens.

2.2 Potential Environmental and Social Impacts during Construction/Renovation Phase

Potential environmental and social impacts during the construction/renovation phase will be mainly from construction/renovation work of the new laboratory building.

Without proper preparation for demolition and construction works and without well prepared preliminary work, the following may be neglected: life, safety measures and basic environmental hygiene facilities (hand washing facilities, toilets and waste disposal facility). In this regard, MOH has already contracted with the design firm to study and analyze the stability and safety of the building. During the construction/renovation phase, there will be a contractor which is responsible for building construction following the design. Basically, the connections part of the buildings is only minor work because the new construction building will not directly extend on the existing building.

The construction/renovation activities may generate dust, noise, vibration, and wastes. Noise and vibration may affect laboratory staff and laboratory service receivers. Long time exposure to annoy noise and vibration from breaking or hitting things like construction of building can cause several associated health problems such as mental problem, stress and anxiety, sleep disturbance, hearing loss, high blood pressure. Dust generation can cause health related problem such as respiratory, eye, and skin problems to workers, patients, and health staff who are present at or nearby the site.

The construction/renovation activities may cause occupational health and safety issues for construction workers and NIPH staff (e.g., collapse of equipment, heating, falling down part of ceilings, failure of installed construction equipment, scatter of debris, heating, inadequate ventilation, etc.) if occupation health and labor management procedure are not in place. Another

safety issues may involve the impact of existing laboratories on health safety of the construction workers. The impact may come from the risk of workers who may expose themselves to laboratory wastes and who may work closer to crowded people who come to NIPH laboratories for COVID-19 testing. Renovated room is at the ground floor of NIPH main building where the existing BSL2+ is being used for running COVID-19 testing (on the first floor of the same building) as well as for sample taking/collection.

Construction waste may cause injury and aesthetic problem. Sharp pieces of broken concrete, broken steel, and broken glass can cut hand or leg of people if they are not properly managed. Piles of construction and demolition waste in hospital compound may result in scattering over the debris, litters and dust when there is a strong wind.

Wastes including solid waste and wastewater generated from the site will create health problems for worker themselves and visitors if they are not managed properly on site. Poor sanitation and hygiene can cause bad smell if wastes are not managed properly.

Improper control on transport of construction materials and waste such sand can result in sand scattering in the NIPH compound when strong wind that can cause accidents. Big truck used to load, transport, and empty construction materials and wastes can cause accidents inside the NIPH compound, especially at the main gate and inside the hospital where there usually crowded of people, if the drivers are not strictly controlled and informed to be careful when driving and parking the vehicles.

Improper management of labor influx and construction workers may cause community[1] disturbance (e.g., gender-based violence, sexual transmitted diseases, violence against children, alcohol abuse, strange behavior, noise, local security, local culture) including NIPH and MOH officials. Labors brought from outside may affect local culture and security if they are not properly managed. Use of child labor during construction activities could occur if contractor does not have a proper control or labor management procedure (LMP) in place.

Improper management of construction workers may cause community disturbance (strange behavior, alcohol abuse, noise, local security, local culture). Labors brought from outside may affect local culture and security if they are not properly managed. However, there will be around 20-50 workers needed and most of them are skill workers that have a better education, good experience in construction work in Phnom Penh. In addition, these workers will come to NIPH compound during working hours in day time from 7:00 am to 5:00 pm only. Some overtime works may be implemented between 5pm to 8pm for wall demolishing and removing of existing floor tiles. The contractor will provide the security guards to take care of the security in and around the construction site and to protect all construction workers/other parties who enter the construction

[1] Community here includes NIPH and MOH officials.

site. The construction/renovation activity from 5pm to 8pm is to avoid the disturbance to the government staff during their working hour, and is also non-disturbance to the surrounding community during this time slot. The workers will not stay inside NIPH compound. Thus, social disturbance from construction workers will be minimal.

These impacts are assessed to be of small scale, localized, in short-term period and manageable if good design and work practices are followed, and the schedule of the construction is short (105 days maximum). In this project case, specific Environmental and Social Code of Practices (ESCOPs) will be followed to avoid any possible impacts during construction/renovation works. The contractors, laboratory staff, MOH's engineer, PMD Team or those who will be carrying out these works will be responsible to implement the ESCOPs. In terms of the civil works construction, MOH engineer team will be assigned by MOH for conducting and supervision. For Environmental and Social Safeguards (ESSs), PMD Team will be responsible for regular monitoring.

2.3 Potential Environmental and Social Impacts during Operation Phase

The project will increase COVID-19 testing capacity of NPHL with installation of a PCR-COBAS 6800 machine as well as provision of basic health items and medical instruments (e.g., glove, glasses, laboratory suits) for protecting laboratory staff from infectious agents, wastes, and injuries for the BSL2+ under H-EQIP Project and BSL3 under COVID-19 ERP. Therefore, laboratory waste and relevant wastewater will be slightly increased.

According to WHO's guideline on safe management of waste generated from healthcare activities, between 75% and 90% of the waste produced by healthcare providers is comparable to general waste. The remaining 10-25% of healthcare waste is regarded as "hazardous and bio-infectious" and may pose a variety of environmental and health risks.

Wastes generated in laboratories are mainly hazardous including sharp waste, infectious waste, pathological waste, pharmaceutical waste, cytotoxic waste, chemical waste, and radioactive waste. In epidemiology laboratory, hazardous wastes are mainly sharp waste, infectious waste, sample and testing waste (blood, stool, urine, body fluids), chemical waste, pathogenic waste, and small amount of pharmaceutical waste.

Pathogens in infectious waste and wastewater may enter the human body by a number of routes: through a puncture, abrasion, or cut in the skin; through the mucous membranes; by inhalation; by ingestion. Sharps represent a double risk. They may not only cause physical injury but also infect these wounds if they are contaminated with pathogens. There is concern about infection with human immunodeficiency virus (HIV) and hepatitis viruses B and C, for which there is strong evidence of transmission from injury by syringe needles contaminated by human blood.

Inappropriate use and management of laboratory equipment, personnel protected equipment (PPE), and infectious agents in laboratory may results in a greater exposure of laboratory staff to risk of injury, aerosol, and ventilation of the infectious agent into the environment.

Improper operation, materials/equipment used, and activities undertook would create potential exposure, health risk and issues to laboratory staff, laboratory workers, visitors, and communities nearby. For instance, inappropriate use of Biological Safety Cabinets (BSCs) would result in greater exposure of laboratory operator, the laboratory environment, and work materials to infectious aerosols and splashes of infectious agent when manipulating materials containing infectious agents, such as primary cultures, stocks and diagnostic specimens.

All individuals who are exposed to laboratory wastes would be at risk if these wastes are not managed properly and carefully. These include those within laboratory establishments such as laboratory staff, laboratory workers, waste collectors, and those outside these sources such as workers working in waste disposal facilities, MOH staff, and visitors. NIPH has put in place a standard operation procedure to mitigate the risk described in 3.3.

Laboratory waste gives its hazards to environment and health as well as public sensitivity. Potential impacts of laboratory waste to environment and health are deemed to be site specific, manageable and for which mitigation measures can be readily designed. However, this impacts can be managed by strict performance on good practice on laboratory waste management, especially infectious and sharp wastes, in all steps including generation, segregation at sources, collection, treatment, handling, storage, and final disposal.

2.4 Potential Environmental and Social Impacts Associated with COVID-19

As the building will be constructed above the existing two laboratory buidlings (main building: virology lab and COVID-19 certificate and micro lab building), construction workers would also be at risk with COVID-19 transmission by air particles (aerosol) in case improper protection/mitigation during the construction work activity.. Following the COVID-19 Master Plan and National COVID-19 Vaccine Deployment Plan, all the construction workers shall be vaccinated against COVID-19. However, to secure more safety to the construction workers and surrounding community all the construction workers have to do rapid test at least once per month by the contractor. Any construction workers who are not vaccinated, shall not allowed to enter the construction site.

There is a possibility for infectious microorganisms to be introduced into the environment if they are not contained within the laboratory due to accidents/emergencies or weak compliance with the precaution measures for infection prevention and control. Improper collection of samples and testing for COVID19 and appropriate laboratory biosafety could result in spread of disease to medical workers or laboratory workers, or population during the transport of potentially affected samples.

The contamination of the laboratory and equipment may result from laboratory procedures: performing and handling of culture, specimens and chemicals. If the contamination is due to a highly infectious agents, it may cause severe human disease, present a serious hazard to workers.

Workers in healthcare facilities are particularly vulnerable to contagions like COVID-19. Healthcare-associated infections due to inadequate adherence to occupational health and safety standards can lead to illness and death among health and laboratory workers as well as spreading the disease into the communities.

The expected laboratory infectious/hazardous waste also includes wastes generated from COVID-19 samples. Laboratory wastes also include sharp, infectious agents, chemicals, other hazardous materials used in laboratory testing. In summary, the laboratoty wastes from COVID-19 could cause a high environmental and social risk, if they are not properly handled, treated or disposed.

Wastes that may be generated from laboratories to be supported by this operation - the COVID-19 readiness and response - could include liquid contaminated waste (e.g., blood, other body fluids and contaminated body fluids) and infected materials (e.g., used water, laboratory solutions and reagents, syringes, majority of waste from laboratories which requires special handling and awareness, as it may pose an infectious risk to healthcare workers who are in contact with or handle the waste).

It is also important to ensure that sharps are properly disposed. Given that the medical waste generated by laboratories is a potential vector for the contagion, improper handling of medical waste runs the risk of further spread of the disease. Poor sanitation and improper management of wastewater related to COVID-19 diagnosis can transmit the diseases to the communities and pollute the environment. Without strict adherence of the infection prevention and control measures, laboratory staff and workers could be at high risk of COVID-19 virus transmission.

3. MITIGATION MEASURES

3.1 Measures to Mitigate Risks and Impacts during the Design Phase

During the construction/renovation phase there will be some impacts from construction/renovation activities including construction/renovation of additional BSL3 laboratory room and installation of laboratory facilities and equipment in the new laboratory room. Thus, the design of this BSL2+ laboratory room and BSL3 laboratory room was completely followed the MOH's Medical Laboratory Biosafety Guidelines. It - strictly includes the primary and secondary barrier concept to prevent and protect laboratory staff, laboratory workers, and visitors from contacting and contaminating with infectious agent, used hazardous materials and wastes generated from the laboratory. Measures to be included in the design of this new BSL2+ laboratory room are presented below.

3.1.1 Risk Assessment

These are new established BSL2+ and BSL3 laboratory rooms, thus conducting risk assessment prior to operation would be necessary to evaluate the potential exposure to or release of a biological agent and wastes and determine/prioritize risks to be mitigated. The objective of risk assessment is

to determine the risks associated with laboratory procedures. It also allows the management to determine the relative risk level of different activities performed in the laboratory, which can be used to make decision on risk mitigation/elimination. The risks and the vulnerabilities in the current biosecurity program will be identified and mitigated/eliminated to ensure that biosecurity risks are reduced to an acceptable level. This risk assessment will be conducted during pre-operation phase after completing the installation of PCR machine and other supporting laboratory equipment. Biosafety and biosecurity team will be in charge in performing this risk assessment. This five-step processes will be adopted for this biosafety risk assessment:

1- Identify hazardous agents and perform an initial assessment of risk;
2- Identify hazardous laboratory procedures;
3- Determine the appropriate biosafety level and select additional precautions indicated by the risk assessment;
4- Evaluate the proficiencies of staff regarding safe practices and the integrity of safety equipment; and
5- Review the risk assessment with a biosafety professional, subject matter expert, and the biosafety committee.

According to Medical Laboratory Biosafety Guidelines, risks from BSL2+ laboratory should match with risk group 2 classification: moderate individual risk, and low community risk. For more detailed risk assessment to determine the risk associated with laboratory procedures, please see Annex 2.11.

The objective of risk assessment is to determine the risks associated with laboratory procedures. Risk assessment allows a laboratory to determine the relative level of risk different laboratory activities pose and help guide risk mitigation/elimination decisions to remove unnecessary risks.

3.1.2 Design features of BSL2+ Laboratory

A BSL2+ was complied with the following conditions:

- Ample space must be provided for the safe conduct of laboratory work and for cleaning and maintenance.
- Walls, ceilings and floors shall be smooth, easy to clean, impermeable to liquids and resistant to the chemicals and disinfectants normally used in the laboratory. Floors shall be slip-resistant.
- Bench tops shall be impervious to water and resistant to disinfectants, acids, alkalis, organic solvents and moderate heat.
- Illumination shall be adequate for all activities. Undesirable reflections and glare shall be avoided.
- Laboratory furniture shall be sturdy. Open spaces between and under benches, cabinets and

equipment shall be accessible for cleaning.

- Storage space must be adequate to hold supplies for immediate use and thus prevent clutter on bench tops and in aisles. Additional long-term storage space, conveniently located outside the laboratory working areas, shall also be provided.
- Space and facilities shall be provided for the safe handling and storage of solvents, radioactive materials, and compressed and liquefied gases.
- Facilities for storing outer garments and personal items shall be provided outside the laboratory working areas.
- Facilities for eating and drinking and for rest shall be provided outside the laboratory working areas.
- Hand-washing basins, with running water, shall be provided in each laboratory room, preferably near the exit door.
- Doors shall have vision panels, appropriate fire ratings, and preferably be self-closing. The laboratory doors shall be closed all the time when tests are being conducted.
- An autoclave or other means of decontamination shall be available in appropriate proximity to the laboratory.
- Safety systems shall cover fire, electrical emergencies, emergency shower and eyewash facilities.
- First-aid areas or rooms suitably equipped and readily accessible shall be available.
- Mechanical ventilation systems that provide an inward flow of air without recirculation shall be provided
- There shall be a dependable supply of good quality water and a reliable and adequate electricity supply
- There is a system for collection and treatment of wastewater. The treatment of wastewater from a laboratory shall meet the national standard before being discharged into public wastewater system.
- There must be signage of biological hazard on the entrance of the testing area.

3.1.3 Design features of BSL 3 Laboratory

- BSL3 facility is suitable for work with infectious microorganisms in Risk Group 3 and incorporates all the equipment and practices for BSL2/BSL2+ laboratories, additional conditions of access, safety equipment and staff training apply
- The design of the facility was taken into account the potential impact of severe environmental and climatic events (such as seismic events, flooding, windstorms, fire, cyclones) that are likely to occur in the area in which it is located so that the risk of damage to the containment barrier is minimized.

- The laboratory must be physically separated from the areas that are open to unrestricted traffic flow within the building and not accessible to the general public. Additional separation may be achieved by placing the laboratory at the blind end of a corridor, or constructing a partition and door or access through an anteroom (e.g. a double-door entry system), describing a specific area designed to maintain the pressure differential between the laboratory and its adjacent space.
- Anteroom is designed to ensure the maintenance of the negative pressure with the BSL3 facility and prevent airflow between the BSL3 facility and external areas. It should not be used for any work, nor should it contain any equipment, washing facilities, or PPE which has been worn in the BSL3 facility.
- Anteroom doors shall be self-closing and interlocking so that only one door is open at a time, minimising disturbance to pressure differentials. Anteroom doors shall be fitted with seals to limit air leakage. A viewing panel shall be installed to minimize entry and exit incidents and for observation of personnel within the facility.
- A system shall be implemented to prevent anteroom doors from opening simultaneously in the event of power loss or emergency. Manual overrides shall be used for exiting in an emergency.
- Decontamination chambers are available for BSL3 facilities that require removal of equipment that cannot be sterilised within the BSL3. These chambers can also support the entry of materials into the facility and act as a pass-through port for smaller materials.
- Doors must be properly labelled with signage restricting access and identify the biological risk.
- Surfaces of benches, walls, floors and ceilings shall be water-resistant and easy to clean and compatible with the decontamination agents used. Openings through these surfaces (e.g. for service pipes) shall be sealed to facilitate and contain any aerosols or gases used for decontamination of the room(s).
- The laboratory room shall be sealable for decontamination and be able to withstand pressures and movement due to pressure fluctuations. Air-ducting systems shall be constructed to permit gaseous decontamination.
- The design of the facility shall avoid inaccessible areas.
- Windows shall be closed, sealed and break-resistant.
- A hand-washing station with hands-free controls shall be provided near the exit door.
- There must be a controlled ventilation system that establishes negative pressure and maintains a directional airflow into the laboratory room. A visual monitoring device with or without alarm(s) shall be installed so that staff can at all times ensure that proper directional airflow into the laboratory room is maintained.

- Where laboratories have supply air systems, the supply air and exhaust air systems shall be interlocked, to ensure inward airflow at all times. The proper directional airflow into the laboratory shall be verified by airflow tests. The laboratory (including the airlock) shall be structurally designed to take account of the operation under negative pressures.

- Failure of a single component, such as an exhaust fan or a supply fan, can result in extremely high positive or negative pressures in the laboratory. Alarms and failure mode operations of ventilation systems shall address this risk to ensure that interlocks operate rapidly to stop systems. The laboratory shall be constructed to withstand, without cracking or deterioration, the maximum positive and negative pressures that can be generated until failure mode safeguards operate. Automatic and manual failure mode sequences shall be independent of any automated control system that may, itself, be the primary cause of a failure situation.
- The laboratory shall be maintained at an air pressure of at least 50 Pa below the pressure of areas outside the BSL3 containment barrier when both doors of the airlock are closed. When either door is open, the laboratory pressure shall remain at least 25 Pa below that of areas outside the BSL3 containment barrier.
  - The building ventilation system must be so constructed that air from the containment laboratory – Biosafety Level 3 is not recirculated to other areas within the building. Air may be high-efficiency particulate air (HEPA) filtered, reconditioned and recirculated within that laboratory. When exhaust air from the laboratory (other than from biological safety cabinets) is discharged to the outside of the building, it must be dispersed away from occupied buildings and air intakes. Depending on the agents in use, this air may be discharged through HEPA filters. A heating, ventilation and air-conditioning (HVAC) control system may be installed to prevent sustained positive pressurization of the laboratory. Consideration shall be given to the installation of audible or clearly visible alarms to notify personnel of HVAC system failure or loss of negative pressure. Alarms shall be sufficiently sensitive to occur before any laboratory pressure becomes positive and before any pressure reversal occurs between different pressure zones within the facility laboratory.
  - An emergency ventilation stop button shall be provided outside the laboratory, adjacent to the exit. The emergency stop mechanism shall operate independently of the main ventilation control and main laboratory pressure control system such that emergency isolation of the ventilation can be implemented in event of central control system malfunction.
  - All HEPA filters must be installed in a manner that permits gaseous decontamination and testing.
  - Biological safety cabinets shall be sited away from walking areas and out of crosscurrents from doors and ventilation systems
  - The exhaust air from Class I or Class II biological safety cabinets, which will have been passed through HEPA filters, must be discharged in such a way as to avoid interference

with the air balance of the cabinet or the building exhaust system.

- Piped gas supplies to the facility must comply with national standards and regulations. Systems shall incorporate flow limiting or free flow protection devices in situations where excessive flow could pose a health hazard.
- An autoclave for the decontamination of contaminated waste material shall be available in the containment laboratory. If infectious waste has to be removed from the containment laboratory for decontamination and disposal, it must be transported in sealed, unbreakable and leakproof containers according to national or international regulations, as appropriate. The autoclave shall not be located in the anteroom.
- Backflow-precaution devices must be fitted to the water supply. Vacuum lines shall be protected with liquid disinfectant traps and HEPA filters, or their equivalent. Alternative vacuum pumps shall also be properly protected with traps and filters.

- Provision shall be made for decontamination of liquid effluents in a manner appropriate to the composition, type and quantity of waste. The method of decontamination and disposal shall be determined using the results of a risk assessment based on the likely composition and volume of the waste and in accordance with applicable regulations. The risk assessment shall include the method of collection, design of drainage systems and transportation pipes to prevent leakage, and the types of decontamination systems, including the equipment rooms where the equipment is located. The risk assessment shall also consider the potential impact due to excess flow from water fixtures (e.g. tap left on) and the release of water from water based fire protection systems, where provided.
- Differencing from domestic wastewater, wastewater from healthcare facilities usually contains more concentration and variety of toxic substances and pathogens. So, expectation of having these specific pollutants in the wastewater from the NIPH laboratory is unavoidable. Allowing the wastewater disposing into environment without proper treatment, the environment and human health can be negatively impacted. So, proper treatment is very much essential to overcome such as issues. In addition, proper wastewater management also contribute to a better livable environment. Adopting concept of separation between stormwater, and wastewater, and as well as specific and domestic discharges are the good approach that the NIPH are currently using. This good practicing significantly helps minimizing amount of wastewater and clustering pollutants to be effectively treated. In this case, a proper wastewater treatment system is really needed for the NIPH to specifically treat the wastewater coming from laboratory activities.

- There are many wastewater treatment systems; however, not every system can be applied to every kind of wastewater or can be used in every condition. Selection of suitable treatment system depends on many factors such as influent and required effluent qualities, environmental conditions, budget availability, and/or operation ability …etc. An Effluent Treatment Plant (ETP) had been selected and designed for Pailin and Oddor Meanchey Referral Hospitals (PRHs) to treat specifically the wastewater from medical activities (such as wastewater from CSSD, OT wash, Laboratory, Cath lab and Scrub stations). This treatment concept can also be used for treating wastewater from the BSL3 laboratory since their influent wastewater are more or less similar in characteristics, and their final effluent discharges are going to be similarly disposed into the public stormwater drainage system.

- This ETP is a kind of chemical treatment system using coagulation-flocculation and settling approach. Lime is used for maintaining or neutralizing the pH of the incoming wastewater, and

Alum or PACl (poly-aluminum chloride) is used as coagulant to form flocs for easy settling. Polymer can be used sometimes to enhance floc formation. Along the settle flocs, suspended solids, particles, colloids, organic matters, microorganisms (virus, bacteria, protozoa, and helminth eggs) can be largely removed. Before discharging into the drainage system, the effluent is supposed to be disinfected by disinfectant such as chlorine. The disinfection is a real critical requirement since the laboratory is dialing with virological analysis, a reservoir of many varieties of pathogenic microorganisms, especially the SARS-CoV-2 virus. However, the good practice of autoclaving or disinfecting of the cultured samples, ware and equipment shall be kept practicing. Furthermore, expired liquid chemicals shall not be disposed into the plumbing system. They shall be disposed and treated offsite as medical waste.

Design features incorporated Safety Primary Barrier: Safety Equipment

- Safety equipment includes BSCs, enclosed containers, and other engineering controls designed to minimize exposure to hazardous biological materials.
- The provision of an uninterruptible power supply shall be considered for BSCs
- Safety equipment includes items for personal protective equipment (PPE), such as gloves, coats, gowns, shoe covers, boots, respirators, face shields, face protection, and safety glasses or goggles.
- Other devices such as hand washing sinks and waste decontamination facilities will be made available to reduce potential environmental contamination.
- Segregate biohazardous/infectious waste from other types of waste prior to its disposal. Infectious waste containers serve as primary barriers to protect the worker and to minimize the chance of environmental contamination. This container shall be placed at the appropriate location inside the laboratory room to avoid access and contact from the public.
- Annual testing of the BSL3 facility must be conducted annually to ensure that its containment requirements comply, including HEPA filter integrity test reports and room pressure readings.

Design features incorporated Safety Secondary Barrier: Facility Design and Construction/renovation

- The design of the construction/renovation works contributes to the protection of laboratory workers, provides a barrier to protect persons outside the laboratory, and protects persons in the community from infectious agents that may be accidentally released from the laboratory.
- These barriers include separation of the laboratory work area from public access, availability of a decontamination facility (e.g. autoclave) and hand washing facilities.
- Prevent risk of infection by infectious aerosols that are released into the environment; the design features shall include special ventilation system to prevent the above risk.

Design features incorporated Physical Security

- Control and monitoring of access to the building, premises, laboratories, and biological material storage areas to prevent unauthorized access to and removal of biohazardous materials.
- Limit access to authorized and designated employees based on the need to enter sensitive areas. The methods for limiting access include door locking or having a key card system in place.
- Access to voids surrounding the immediate perimeter of the laboratory and to the ventilation equipment that serves the laboratory shall be restricted to authorized persons. Items of equipment, ducts and access panels to contained sections of the ventilation system shall be marked with biohazard labels to minimize the risk of accidental exposure to air or to contaminated surfaces. The installation of services shall ensure proper access to equipment such as HEPA filters for maintenance and testing personnel and their equipment.

Design features incorporated Management of Personnel, Inventory, and Accountability

- Identify roles and responsibilities of employees who handle, use, store and transport dangerous pathogens and/or other important assets.
- Establish material accountability procedures to track the inventory, storage, use, transfer and destruction of dangerous biological materials and assets when they are no longer needed.
- Laboratory personnel must undertake appropriate training and be proficient in handling infectious materials and in the use of safety equipment and controls.
- The laboratory management shall establish policies and written procedures whereby only persons who have been advised of the biohazard, and who meet any medical requirements, shall enter the laboratory.
- An effective emergency evacuation plan shall be devised, and information on the action shall be available to all laboratory staff.

3.2 Measures to Mitigate Impacts during Construction/Renovation Work

This section applies the ESCOPs to be performed by the contractor. During civil works, the contractor shall be responsible to implement ESCOPs to mitigate environmental and social impacts (see Table2).

Table 2: Environmental and Social Code of Practices (ESCOPs)

Environmental and social issues	**Mitigation measures**	Responsibilities	Supervision and Monitoring

Without proper construction works and without well prepared preliminary work, life and safety measures and basic environmental hygiene facilities may be neglected.	To respond to these environmental and social issues/concerns and occupational health and safety of workers, the contractor shall follow these measures: • Before starting construction activities, the contractor shall install temporary safety protection fences with proper height surrounding the construction site and put safety signs and construction sign boards. • The contractor shall submit its statement/construction method and technology for construction in the bidding document as an Annex; • Identify appropriate locations and install hygiene and sanitation facilities including sinks for hand washing, wearing masks, toilets and bathrooms at appropriate locations inside the construction site. Make available of alcohol/hand gel and soaps; • Identify appropriate locations to place the garbage bins and set up schedule and responsible persons to collect and empty the bins; • Educate workers about how to use these hygiene, sanitation, and waste facilities properly; • Install proper size safer camp/accommodation for workers that provide enough room for worker to keep social space respond to Covid19. The Camp can be used by their workers as a safe place to have lunch and to rest when they are not well. • Provide the security guards to take care of the security in and around the construction site and to protect all construction workers/other parties who enter the construction site. • A temporary gate shall be opened at western side of NIPH fence close to construction site for purpose of transporting construction equipment, materials, wastes, and mobility of construction workers in and out construction site.	• Contractor	• NIPH

Risk of accidents from moving big truck transport construction materials and wastes inside NIPH compound.	• The existing gates of NIPH normally are busy and blocked by car parking. NIPH shall open a temporary gate just for this construction truck only at its western side fence closed to construction site. • Contractor shall strictly control moving of truck inside NIPH compound through providing security guard to make traffic. In this regard, few security guards shall be assigned for directing traffic to minimize any accident in particular during school hours and outside compound when trucks are coming in and out. Furthermore, the stop signs and the whistles shall be used during the trucks are coming in and out the NIPH compound.	• Contractor and driver	• NIPH, NIPH/MOH security guards
Dust, noise, ventilation and vibration generated from construction works	• The contractor is responsible for compliance with relevant national legislation with respect to ambient air quality, noise and vibration. • The contractor shall ensure that the generation of dust is minimized and implement a dust control plan to maintain a safe working environment and minimize disturbances for laboratory staff and surrounding community. • The contractor shall implement dust suppression measures (e.g. water paths, covering of construction material/debris stockpiles, etc.) as required. Construction debris and materials shall be covered to protect against wind erosion and secured properly during transportation to prevent scattering of soil, sand, materials, or generating dust. • The contractor shall use machinery instead of workforce for major demolition work. The contractor shall use construction techniques that are safer with lesser noise and vibration generation. For example, to prepare foundation of the new building, the contractor shall use pressure technique instead of hitting technique.	• Constructor	• NIPH

	• The contractor shall check the air ventilation whether it is adequate during the construction/renovation work that produce dust/lack of natural air through the room. • The contractor should not carry out construction/renovation activities generating high level of noise and vibration during laboratory activities, especially when services are being delivered to the clients. • Contractor shall require truck transport of construction materials or wastes to cover properly to avoid scatter along moving road and in hospital compound. • Drivers of trucks should be reminded very often about carefulness on driving and parking the truck.		
Wastes generated from construction/renovation works	• The contractor shall ensure that onsite latrine be properly operated and maintained to collect and dispose wastewater from those who do the works; • The contractor shall develop and follow a brief site-specific solid waste control procedure (storage, provision of bins, site clean-up, bin clean-out schedule, etc.) before commencement of any financed rehabilitation works; • The contractor shall use litter bins, containers and waste collection facilities at all places during works; • The contractor may store solid waste temporarily on site in a designated place prior to off-site transportation and disposal through a licensed waste collector; • The contractor shall dispose of waste at designated place identified and approved by NIPH. Open burning or burial of solid waste at the NIPH premises shall not be allowed; • Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding,	• Constructor	• NIPH

	packaging material, etc. shall be segregated and collected on-site from other waste sources for reuse or recycle (sale); • When construction/renovation activities are completed, the contractor will clean the site carefully and remove all construction/renovation waste materials and dump it at designated dumping site.		
Safety risks during works	• The contractor shall comply with all national and good practice regulations regarding workers' safety including ensuring that no child labor is employed for any construction/renovation works; • The contractor shall prepare and implement a simple action plan to cope with risk and emergency (e.g., fire, floods); • The contractor shall have or receive required training on occupational safety regulations and use of personal protective equipment; • Occupational Health and Safety (OHS) management plans will be developed by the contractor where ESCOPs do not suffice. This OHS management plans will include OHS trainings, OHS monitoring at the construction/renovation site and maintaining records of work-related injury statistics and follow up on corrective actions; • The contractor shall provide safety measures as appropriate during works such as installation of fences, safety net, fire extinguishers, first aid kits, restricted access zones, warning signs, overhead protection against falling debris, lighting system to protect laboratory staff, workers and examinees against work risks; • The contractor shall provide training to workers and require them to sign a working code of conduct with appropriate disciplinary actions and penalties for inappropriate behavior including gender-based	• Contractor	• NIPH

	violence, violence against children and sexual harassment affecting their peers and community; • Awareness raising about HIV/AIDs among workers and community shall be conducted by the contractor; • Provide information and signage containing information of how grievances can be submitted; • The contractor shall install the ventilation system in the room if the air is found to be inadequate during construction/renovation activity; • Place a gender based violence (GBV) free zone signage at the construction/renovation site; • The contractor shall install the safety nets to protect people working in the compound from debris sparking; • All visitors including MOH and laboratory staff shall be required to wear safety helmet and eye glasses during their site visit.		
Community disturbance due to improper management of construction/renovation workers	• The contractor shall develop internal rules to manage construction/renovation workers' behaviors, and supervise their compliance; • The contractor shall ensure that workers do not stay inside NIPH compound after working hours; • The contractor shall start demolishing works from 5pm to 8pm to avoid disturbance to laboratory staff during working hours with a provision of one security guard to safeguard the construction/renovation site and the construction/renovation workers. • The contractor shall develop internal rules to manage construction workers' behaviors, and supervise their compliance; o Awareness raising about HIV/AIDs among workers and community shall be conducted by the contractor; • Place a gender-based violence (GBV) free zone signage at the construction site;	• Contractor	• NIPH

	• Contractor shall clearly separate toilets and bathrooms of men and women; • GBV code of conduct shall be included in contract document for contractor as an obligation to be performed by contractor; • Contractor shall prepare code of conduct for GBV and required construction staff to sign prior commencement of construction work; • Contractor shall also include GBV in training provided to workers; • The contractor shall not allow workers to have a party or to use alcohol/beers in the construction site; • The contractor shall ensure that workers do not stay inside the hospital compound after working hours; • Night work shall be minimized; • Contractor shall put in place Labor Management Procedure (LMP) as specified in section of MP and the prohibition the use of child labor.		
Occupational Health and Safety Issues and risk in exposing to laboratory wastes	• The contractor shall prepare Occupational Health and Safety (OHS) management plans; • OHS trainings shall be provided by the contractor to the workers before starting the demolition and construction activities; • The contractor shall frequently conduct meetings with their workers and remind them on carefulness/safety adherence during their works; • The contractor shall ensure the presence of civil work supervisor at the site all the time. • The contractor shall conduct OHS monitoring at the construction site regularly and install on site monitoring equipment (e.g. safe camera, ventilated detector, heat detector, ...) as necessary. • The contractor shall ensure the availability of safety equipment (e.g. helmet, glasses, glove, boot, ...)	• Contractor	• NIPH

	The contractor shall maintain statistical records of work-related injury and follow up on corrective actions. This record shall be prepared on a white board in the construction site to inform all the related parties about the injury status. • The contractor shall develop internal rules to manage workers movement within the designated area inside NIPH; • The contractor shall know clearly about the designated locations of laboratory infectious waste storage and shall inform their workers not to go closer to these locations; • The workers shall wear face mask all the time when performing their works in NIPH compound; • The contractor shall provide a separate smoking area in the site while the rest of the areas are not allowed for smoking.		
Working closely to COVID-19 testing and sample taking laboratories located inside NIPH coupled with workers poor working condition may facilitate COVID-19 transmission for them and other people.	• The contractor shall develop internal rules to manage workers movement within the designated area inside NIPH to prevent being closer to crowded people who come to NIPH for COVID-19 testing by wearing masks, keep social distance, and other rules as specified to prevent COVID-19; • Construction/renovation site shall be clearly separated from sample taking area and laboratories by thick fences; • The contractor shall review and incorporate interim guideline on COVID-19 prevention in the construction/renovation civil works project. For the details of this guideline, please see Annex 3. The contractor shall comply with COVID-19 prevention measures as follows: o Consider ways to minimize/control movement in and out of the construction/renovation areas/sites;	• Contractor	• NIPH

	o Follow the procedures to confirm that workers are fit for work before they start working and pay special attention to workers who have underlying health conditions or who may be otherwise at risk; o Check and record temperatures of workers and other people entering the construction/renovation areas/sites or ask for self-reporting before entering the sites; o Provide daily briefing to workers prior to commencing their works, focusing on COVID-19 specific prevention including cough etiquette, hand hygiene and distancing measures; o Request workers to self-monitor for possible symptoms (fever, cough, etc.) and to report to their supervisors if they have symptoms or are feeling unwell; o Prevent workers from an affected area or prevent workers who was in contact with an infected person from entering the construction/renovation areas/sites for 14 days with an insurance in place to ensure that they can receive their salary, as per the Labor Management Plan (LMP) in the Annex 5; o Prevent sick workers from entering the construction/renovation areas/sites, refer them to local health facilities if necessary, or request them to quarantine at home for 14 days (with an insurance in place to ensure that they can receive their salary, as per the LMP); o Develop a contingency plan with arrangements for accommodation, care and treatment for: ▪ Workers who are self-isolating; ▪ Workers who display symptoms; o Provide adequate water, food and supplies;		

	o Provide workers with PPEs; o Provide workers with accommodation that meets or exceeds IFC/EBRD worker accommodation requirements (e.g. in terms of floor type, proximity/number of workers, number of 'hot bedding', drinking water, separation of washing facility and bathroom facility for male and female, etc.), which is in good state, clean and hygienic to minimize the spread of infection;. However, workers will come to NIPH compound during working hours in day time from 7:00 am to 5:00 pm only. o Washing stations should be provided throughout the site, together with the supply of clean water, liquid soap and paper towels (for hand drying), and waste bins (for used paper towels) that are regularly emptied. Washing stations should be provided wherever there is a toilet, canteen, accommodation, waste storage areas, stores, and communal facilities. Where washing stations cannot be provided (for example at remote locations), alcohol-based hand rub should be provided; o Enhanced cleaning arrangements should be put in place, to include regular and deep cleaning using disinfectant of catering facilities/canteens/food/ drink facilities, latrines/toilets/showers, communal areas, including door handles, floors and all surfaces that are touched regularly (ensure that cleaning staff have adequate PPE when cleaning consultation rooms and facilities used to treat infected patients);		

	○ Communication materials on COVID-19 prevention and control should be displayed in the workplaces; ○ Ensure that contracted workers have medical insurance, covering treatment of COVID-19. • All these measures shall be incorporated or attached as a supported document to the contract to make sure that the contractor is aware of all these requirements.		
Labor management procedure and the prohibition the use of child labor	• Labor law prohibits anyone under 18 years to be involved in hazardous work. Child labor or indentured labor is absolutely prohibited in the project. • The contractor shall ensure that all their workers at the construction site are over 18 years old regardless of the type of work. • Contractor shall strictly prohibit presence of children under 18 years old of age at the project site. This includes child/children of workers. • Contractor shall develop labor management procedure (LMP) and put in place this LMP before starting construction activities. The developed LMP of contractor shall include: (i) A review of national labor legislation; (ii) Types and number of workers; (iii) Time of labor requirements; (iv) Labor training schedule; (v) Assessment of key potential labor risks and actions to management labor risks in each stage of construction; and • Workers' Grievance communication	• Contractor	• NIPH and assigned civil work supervision team
Workers who are under 18 years old can be employed to	• Child labor or indentured labor is absolutely prohibited in the project. • Labor law prohibits anyone under 18 years to be involved in hazardous work.	• Contractor	• NIPH

work with lower salary.	• The contractor shall ensure that all their workers at the construction/renovation site are over 18 years old. • In terms of primary supply workers, Checklist on Supply Chain shall be used by PMD Team to ensure that there are no any risks of forced or child labor or serious safety issues in the primary supply chain this applies for the materials/goods that are essential to the project as attached in Annex 5. •		

3.3 Measures to Mitigate Impacts from Laboratory Operations

Measures to mitigate the impacts during laboratory operation include procedures for laboratory biosafety and procedures for laboratory waste management.

3.3.1 Procedures for Laboratory Biosafety

3.3.1.1 Procedure for the use of personal protective equipment

PPE needs are identified, made available, used and appropriately maintained within the facility.

Laboratory clothes: clothing is a barrier to minimize the risk of exposure to aerosols, splashes and accidental inoculation. The clothing and equipment selected depend on the nature of the work performed and shall be based on the risk assessment. Laboratory coat and protective clothing shall be worn when working in the laboratory and removed before leaving the laboratory. Reuse laboratory coat shall be washed in laundry machine by adding bleach for decontamination.

Laboratory coats, gowns, coveralls, aprons: Laboratory coats should preferably be fully buttoned. Long-sleeved, back opening gowns or coveralls give better protection than laboratory coats and are preferred in microbiology laboratories and when working at a Biological Safety Cabinets (BSCs). Aprons may be worn over laboratory coats or gowns where necessary to give further protection against spillage of chemicals or biological materials such as blood or culture fluids. Aprons should also be worn during washing of contaminated materials and over laboratory coats which are not fully buttoned. Laundering services need to be provided at/near the facility. Laboratory coats, gowns, coveralls or aprons should not be worn outside the laboratory areas.

Goggles, safety spectacles, face shields: The choice of equipment to protect the eyes and face from splashes and impacting objects will depend on the activity performed. Safety glasses do not provide adequate splash protection even when side shields are worn with them. Goggles for splash and impact protection should be worn over normal prescription eye glasses and contact lenses (which do not provide protection against biological or chemical hazards). Face shields (visors) are made of shatterproof plastic, fit over the face and are held in place by head straps or caps. Goggles, safety glasses or face shield should not be worn outside the laboratory areas.

Respirators: Respiratory protection may be used when carrying out high-hazardous procedures (e.g. cleaning up a spill of infectious material). The choice of respirator will depend on the type of hazard(s). To achieve optimal protection, respirators should be individually fitted to the operator's face and tested before use. Fully self- contained respirators with an integral air supply provide full protection. Respirators should not be worn outside the laboratory areas.

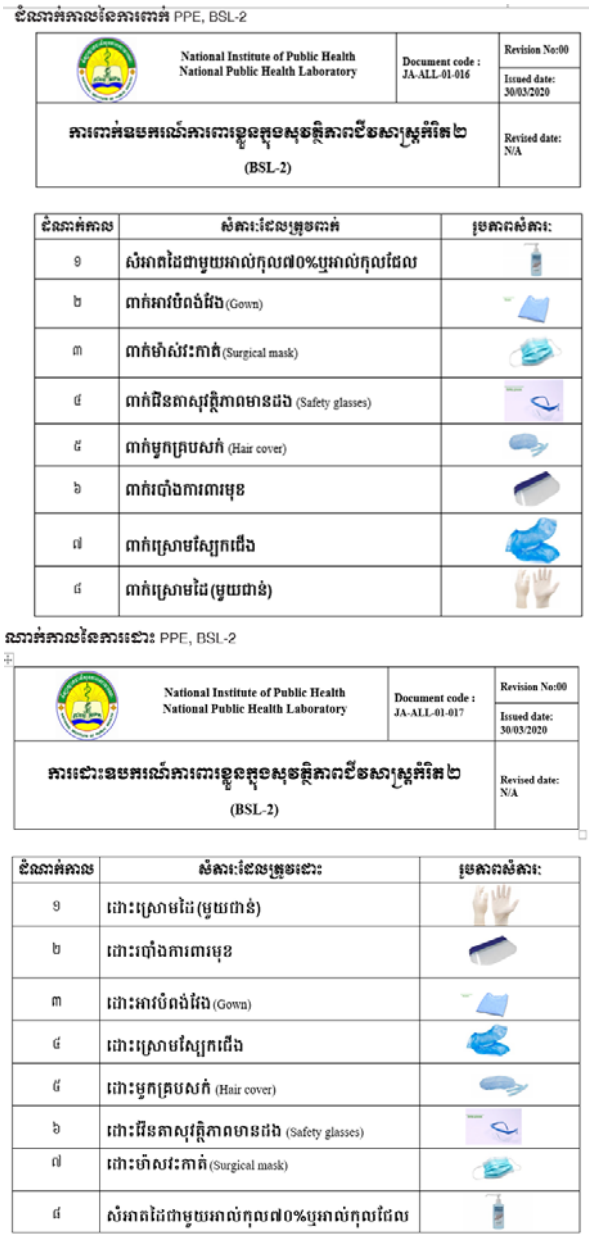
Gloves: Disposable microbiologically approved latex, vinyl or nitrile surgical-type gloves should be used for general laboratory work, and for handling infectious agents, blood and body fluids. Gloves should be removed and hands should be thoroughly washed after handling infectious materials, working in a BSC and before leaving the laboratory. Used disposable gloves should be

discarded with infected laboratory waste. Disposable gloves should not be decontaminated or reused. Gloves should not be worn outside the laboratory areas.

Shoes: Shoe covers or dedicated shoes should be worn where appropriate. All personnel entering areas where infectious materials and/or animals are housed or manipulated should wear boots, shoe covers, or other protective footwear to prevent cross contamination and should only wear them in the restricted laboratory areas.

Figure 6 presents required PPEs for laboratory staff to be taken on and taken off in BSL-2. Hands shall be washed with soap or alcohol after removal of the protective clothing.

Figure 6: PPEs used in BSL-2 laboratory: take on (left) and take off (right)



ជំនាក់កាលនៃការពាក់ PPE, BSL-2

National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-016	Revision No:00 Issued date: 30/03/2020
ការពាក់ឧបករណ៍ការពារខ្លួនក្នុងសុវត្ថិភាពជីវសាស្ត្រកំរិត២ (BSL-2)		Revised date: N/A

ជំនាក់កាល	សំគារៈដែលត្រូវពាក់	រូបភាពសំគារៈ
១	សំអាតដៃជាមួយអាល់កុល៧០%ឬអាល់កុលជែល	
២	ពាក់អាវបំពង់វែង (Gown)	
៣	ពាក់មាសំវះកាត់ (Surgical mask)	
៤	ពាក់ជីនតាសុវត្ថិភាពមានជង (Safety glasses)	
៥	ពាក់មួកគ្របសក់ (Hair cover)	
៦	ពាក់របាំងការពារមុខ	
៧	ពាក់ស្រោមស្បែកជើង	
៨	ពាក់ស្រោមដៃ(មួយជាន់)	

ឈានក់កាលនៃការដោះ PPE, BSL-2

National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-017	Revision No:00 Issued date: 30/03/2020
ការដោះឧបករណ៍ការពារខ្លួនក្នុងសុវត្ថិភាពជីវសាស្ត្រកំរិត២ (BSL-2)		Revised date: N/A

ជំនាក់កាល	សំគារៈដែលត្រូវដោះ	រូបភាពសំគារៈ
១	ដោះស្រោមដៃ(មួយជាន់)	
២	ដោះរបាំងការពារមុខ	
៣	ដោះអាវបំពង់វែង (Gown)	
៤	ដោះស្រោមស្បែកជើង	
៥	ដោះមួកគ្របសក់ (Hair cover)	
៦	ដោះជីនតាសុវត្ថិភាពមានជង (Safety glasses)	
៧	ដោះម៉ាសវះកាត់ (Surgical mask)	
៨	សំអាតដៃជាមួយអាល់កុល៧០%ឬអាល់កុលជែល	

Source: NIPH (2017a)

The instruction for proper use of PPEs in BSL-2 is detailed in SOP-Personal Protective Equipment in Annex 2.1 of this document. The instruction for proper use of PPEs during working with COVID-19 cases is detailed in the Annex 4 – Specific measures for COVID-19 infection prevention and control

3.3.1.2 Procedure for operation of laboratory safety cabinet

BSCs are designed to protect the operator, the laboratory environment and working materials from exposure to infectious aerosols and splashes that may be generated when manipulating materials containing infectious agents. BSCs also protect the environment in the laboratory. Properly used of BSCs is highly effective in reducing laboratory-acquired infections and cross-contaminations of cultures due to aerosol exposures. Selection of BSC Class 2 is reasonable for the BSL2+.

Locating BSCs in the laboratory

BSCs should be situated in a location remote from traffic and potentially disturbing air currents. A clearance of 30–35 cm above the cabinet is required to provide accurate air velocity measurement across the exhaust filter and to allow convenient exhaust filter change.

Detailed procedure for operation and maintenance of BSCs is elaborated in SOP-Biosafety Cabinet Operation and Maintenance in Annex 2.2 of this document.

3.3.1.3 Procedure for operation of autoclave

Autoclaves are used to decontaminate contaminated reuse laboratory materials, infectious wastes and sharp wastes prior to disposal. For operation and maintenance of autoclave machines, please see the details in SOP-Autoclave Prioclave in Annex 2.3 of this document.

3.3.1.4 Procedures for decontamination, disinfection and sterilization

NIPH will establish and maintain procedures to ensure that appropriate methods for sterilization, disinfection, antisepsis and decontamination are chosen and implemented effectively. Whether preparing an injection site on a patient's skin, or an infectious material for disposal or cleaning up a spill, it is of the utmost importance that the materials be treated properly:

- Sterilization is the use of a physical or chemical procedure to destroy all microbial life, including highly resistant bacterial endospores.
- Disinfection is the elimination of virtually all pathogenic microorganisms on inanimate objects with the exception of large numbers of bacterial endospores, reducing the level of microbial contamination to an acceptable safety level.
- A decontamination procedure can range from sterilization to simple cleaning with soap and water. Sterilization, disinfection and antisepsis are all forms of decontamination.

Bleach, a fast-acting oxidant, is broad-spectrum chemical germicide. It is important to note that bleach is highly alkaline and can be corrosive to metal. Household bleach (original concentration 5% or 6%) should be prepared to the proper concentration and discard daily after use.

Procedures on disinfection, decontamination, and sterilization are details in SOP-Disinfection Solutions and Sterilization in Annexes 2.8 and 2.9 of this document.

Instruction for cleaning and disinfection during working with COVID-19 cases is detailed in the Annex 4 – Specific measures for COVID-19 infection prevention and control.

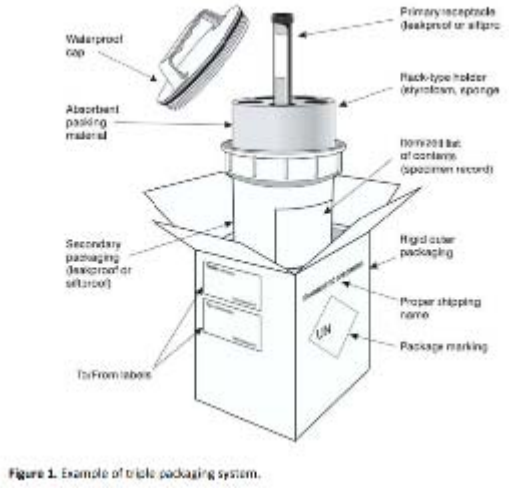
3.2.1.5 Procedure for packaging, transportation, receipt and process of samples

Ensure that procedures for safe and secure transportation of cultures, specimens, samples and contaminated or potentially contaminated materials are established and maintained in accordance with legal requirements for the transportation of dangerous goods. Policy on transport of materials includes accountability measures for the movement of materials within an institution. Annex 2.6 presents SOP- Sample Package and Transportation.

The triple packaging system

The triple packaging system is the safest packaging system to transport infectious agents/materials. It consists of three layers: a leakproof primary receptacle, a leakproof secondary packaging and a sturdy outer packaging. The primary receptacle is wrapped in enough absorbent material to absorb all fluid in case of breakage or leakage. The secondary receptacle is used to enclose and protect the primary receptacle(s). Several wrapped primary receptacles may be placed in a single secondary receptacle.

Figure 7: Triple package system

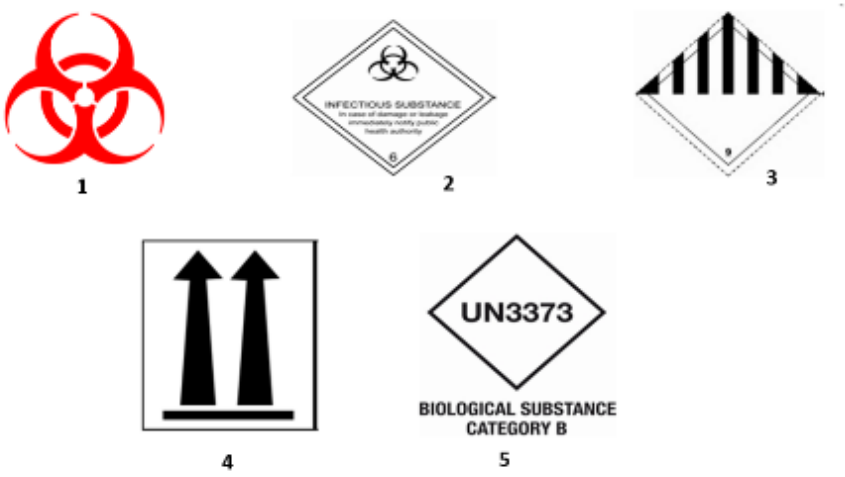


Source: MOH (2015).

A. Label on packaging

The below labels describe the infectious substances required to place on the package for transportation.

Figure 8: Labels of infectious substances required to place on package for transportation



1- Biohazard sign: infectious materials, infectious wastes;
2- Hazard label for Category A infectious substances and for genetically modified microorganisms and organisms that meet the definition of an infectious substance;
3- Hazard label for certain noninfectious genetically modified microorganisms and organisms (UN 3245) and for carbon dioxide, solid (dry ice) (UN 1845); substances packed in dry ice (see section on Refrigerants) shall bear this label in addition to the primary risk label (e.g. the label shown in Figure 3 for Category A infectious substances;

4- Orientation label to indicate position of closures on the primary receptacles; for the air transport of quantities of liquid infectious substances in Category A that exceed 50 ml per primary receptacle, this label shall be affixed to two opposite sides of the package with the arrows pointing in the right direction, in addition to the label shown in Figure

5- UN 3373, are human or animal materials that are being transported only for the purpose of diagnosis or investigation.

3.5. Procedures for Laboratory Waste Management

NPHL will strictly implement waste management plan and standard operation procedure for waste management, which will follow good practice standards on how to properly manage laboratory wastes. Good practice standards on laboratory waste management, especially infectious and sharp wastes, will be strictly followed. They include generation, segregation at sources, collection, treatment, handling, storage, and final disposal. Below are procedures for laboratory waste management at NIPH.

3.5.1 Procedure for waste segregation, collection and preliminary treatment in laboratories

NPHL will implement SOPs for waste management, disposal of chemical waste, disposal and decontamination of sharp wastes, disinfection solution and sterilization including minimization, segregation, storage, transport, treatment and final disposal of solid laboratory wastes. The procedures for laboratory waste management are detailed in SOPs on Waste Management, Disposal of Chemical Waste, and Disposal and Decontamination of Sharp in Annexes 2.7, 2.8, 2.9, and 2.10 of this document. Table 3 mentions mitigation measures and methods to minimize impacts from laboratory generated wastes.

Table 3: Laboratory Waste Management

Environmental issue	**Mitigation measures**
Individual risk associated with exposure to laboratory wastes, infectious wastes and sharp wastes.	- Strictly apply good practices on laboratory waste management, especially infectious and sharp wastes management. - Apply SOPs on waste management such as waste segregation, collection, treatment, handling, storage, and disposal; waste decontamination, disinfection, and sterilization. - Strictly control the practices of wastewater treatment at source through regular monitoring of compliance to good practices and to ensure that treated wastewater meet the standard of laboratory wastewater safe disposable into the public wastewater system.
Solid medical laboratory wastes,	NPHL will apply SOPs on waste management including disposal of chemical wastes, disposal and decontamination of sharp wastes, disinfection, and

especially sharp wastes and infectious wastes, generated from laboratory.	sterilization including minimization, segregation, storage, transportation, treatment and final disposal of solid laboratory wastes. **Segregation of laboratory wastes** • All type of wastes will be segregated at source. • Separated waste containers/bags are clearly designated by color with appropriate logos according to the type of wastes: black color container/bag for general waste, yellow for infectious wastes (i.e. pathological waste, blood, body fluids), double yellow for high risk infectious wastes, red for sharp wastes, and brown for chemical and pharmaceutical wastes. • The waste containers are put at the most appropriate places closer to the sources of generation. • Training is provided to ensure that laboratory staff and workers are well understood on how to segregate wastes. **Labeling** • All waste containers are placed at the source of generation and should be clearly marked with biohazard symbol. • The date when the waste is first generated is written on the waste container with appropriate label for storage. • Laboratory wastes requiring autoclaving or other equivalent treatment will be labelled accordingly. **Storage of laboratory wastes** • Different laboratory wastes will be stored separately in standard storage equipment. • Storage time of laboratory wastes will not exceed 48 hours. • Storage room or place and storage equipment will be cleaned and disinfected at least once a week. • Specific areas will be identified for the initial storage in the laboratory rooms, near the source of waste generation. • Central storage facility for infectious wastes is separated from general waste storage areas and be away from public access. • Waste for sanitary landfill and/or for incineration are stored separately in the central storage area. **Transportation of laboratory wastes** • Waste containers from initial storage area will be emptied regularly.

	• Manual handling of waste bags will be minimized. • Dedicated wheeled containers, trolleys or carts should be used to transport the waste containers to central storage area. • Transport vehicles shall be reserved only for the transportation of laboratory and healthcare wastes. • Wheeled containers, trolleys or carts should be cleaned and disinfected regularly and immediately after spillage or contamination. **Central storage facility for laboratory wastes** • Central storage facility should be locked and should be accessible only by authorized persons. • It should be well ventilated with sufficient light. • It should be located on a well-drained, impervious hard-standing area, provided with wash down and disinfection facilities. • It should have sufficient storage capacity. **Treatment of laboratory wastes** • Infectious waste will be autoclaved wherever possible before disposal. • Non-autoclave infectious waste will be disinfected by using bleach solution, lime solution, calcium oxide or other chemical disinfectants. • Needle cutter will be used to remove needles from syringes. • Defanged syringes should be disinfected with 2% chlorine solution in order to be recycled. **Autoclave:** is used for the treatment of highly infectious wastes, such as microbial cultures or sharp waste. **Standard incinerator:** Two-chambered incinerators with proper temperature and sufficient chimney height should be used. The temperature must be at least 850C to ensure minimal emission of toxic gases at the primary chamber. **Chemical disinfection:** 0.5% chlorine solution, 5% sodium hypochlorite, 30% hydrogen peroxide, bleaching powder, lime solution, calcium oxide or other chemical disinfectants can be used for non-autoclavable infectious wastes. **Sanitary landfill:** Sanitary landfill is close to the working areas where wastes are generated providing easy access for waste disposal. Landfill site should be at least 50 meters away from the water sources. **Encapsulation and energization:** It is usually used as a disposal method for pharmaceutical wastes and incinerated ash of heavy metals.

Occupational Health issues among laboratory staff	Occupational Health and Safety training program will be developed and provided to laboratory staff on aspects linked to laboratory waste management and infection control. This training program can be offered by biosafety and biosecurity team of NIPH.

Instruction for medical waste management generated from COVID-19 care and treatment is detailed in the Annex 4 – Specific measures for COVID-19 infection prevention and control

3.5.2 Biohazardous waste handling and disposal

Hazardous waste poses high risks to the laboratory staff, the general public, and the environment if not handled properly. Therefore, all staff involved with waste handling and disposal should be aware of the potential risks, be trained to mitigate the risks, and receive appropriate tools (e.g. PPEs, waste collection containers, signage, etc.) to safely handle the wastes.

All infectious waste generated from a laboratory should be decontaminated prior to disposal. Decontamination as close as possible to the point or source of generation fosters safer waste handling and minimizes the chance of staff inadvertently coming in contact with infectious materials.

3.5. 3 Procedure/method for chemical waste treatment and disposal

Incineration is useful for disposal of laboratory wastes, with or without prior decontamination. Proper incineration requires an efficient temperature control and a secondary burning chamber. There are some concerns regarding the possible negative environmental effects of the existing or the proposed incinerators. However, efforts are continuously made to ensure that incinerators are more environmentally friendly and energy-efficient. The procedure for chemical waste treatment and disposal is detailed in SOP- Disposal of Chemical Waste, Annex 2.10.

3.5.4 Wastewater collection and treatment system

Wastewater generated from laboratory facilities will be disposed according to the reference guidelines for healthcare and laboratory facilities and WHO's guidelines for safe management of waste from healthcare and laboratory activities. NIPH does not have onsite wastewater treatment facility. All wastewater generates from laboratory facilities/machines and from cleansing/sterilizing of reuse laboratory materials will be collected at source for treatment before discharge to public wastewater. Bleach solution/powder will be used as disinfectant for treating collected wastewater. Concentration and volume of bleach solution used depend on the level of contaminated wastewater and its volume as describe in the SOP-Disinfection Solution and Sterilization in Annex 2.9.

3.3.3 Procedures for Fire Safety

3.3.3.1 Fire detecting system monitoring

Install detective devices such as fire alarm, automatic smoke detectors, and automatic door access. The procedure for fire detecting system monitoring is detailed in the SOP-Fire Detective System Monitoring in Annex 2.4.

3.3.3.2 Emergency evacuation plan

Identify evacuation routes and maps designed in response to emergency situation such as in case of fire, natural disasters, and chemical spills. For the details of the procedure for emergency evaluation plan, please refer to the SOP-Emergency Evacuation Plan in Annex 2.5.

Potential impacts during operation phase will be well managed since risk assessment will be conducted in all procedures related to laboratory testing. Biosafety cabinet class 2 will be used to minimize the potential impacts on laboratory staff and environment. BSL2+ room will be used to perform testing on sample which has high pathogenic risk. In addition, biosafety team will conduct routine monitoring and supervision in the laboratory. All molecular staff who will work in the renovated laboratory facilities have been well trained and passed the staff competency assessment. All technical, management, and biosafety and biosecurity procedures are available for all staff to use in their relevant stations.

3.3.4 Labor Management Procedures

Labor Management Procedure (LMP) is developed for management of labors needed, risks of labor used, and measures to manage risks for this established BSL3 laboratory at NIPH. It provides overview on labor use on subproject, relevant national labor legislation, types and number of workers need, time of labor requirements, labor training schedule, assessment of key potential labor risks and actions to management labor risk in each stage of construction, and workers' grievance communication, and templates on Code of Conduct for Contractors and Workers. For details of this LMP please refer to Annex 5 of this ESMF.

As relevant, the requirements for human resource management and training for laboratory staff are specified in the NIPH's SOPs on Personnel Management and Staff Training. SOP on Personnel Management clearly states principle that all NPHL personnel have received adequate training, understand their roles and responsibilities and understand all of NPHL personnel policies. Procedure of staff management includes recruitment of qualified NPHL personnel; requirement for participating in orientation training to ensure they understand NPHL quality and safety policies; provision of training to all staff on their technical area prior to beginning work, and performing a competency assessment of each person to perform their assigned managerial and technical staff based on NPHL established criteria.

Additionally, SOP on Staff Training of NIPH clearly states principle that "properly trained qualified personnel are essential to a properly managed laboratory and achieving high quality testing results. Procedure of staff training include provision of training for all personnel which

include the quality management system, assigned work processes and procedures, the applicable laboratory information system, health and safety, including the prevention or containment of the effects of adverse incidents, ethics, confidentiality of patient information, and personnel that are undergoing training are supervised at all times. For more details of SOP on Personnel Management and SOP on Staff Training, please refer to Annex 2.12 and Annex 2.13 respectively. Procedure of Human Resource and Training Management Procedure.

Besides, NIPH will incorporate standardized code of conduct and occupational health and safety clauses in the tender documentation and contract documents in order for potential bidders to be aware of requirements that shall expected from them, are able to reflect that in their bids, and required to implement the clauses for the duration of the contract. As a core contractual requirement, the contractor is required to ensure all documentation related to OHS and the LMP, is available for inspection at any time by NIPH. The contractual arrangements with each project worker must be clearly defined. All relevant OHS and LMP requirements will be included in the bidding documents and contracts.

In addition, NIPH will be responsible to ensure that safe messaging around COVID-19 prevention and OHS measures are distributed and available to all project staff directly hired/working for NIPH, as per provisions in this LMP. All project workers must be aware of and sign the Manager's Code of Conduct (Annex 5A) and/or the Individual Code of Conduct (Annex 5B), as applicable.

3.3.4.1 Occupational Health and Safety (OHS)

All project workers should receive training on OHS, as it relates to working in laboratory environments and managing hazardous medical waste, as well as COVID-19 prevention, social distancing measures, hand hygiene, cough etiquette and relations with local community. Training programs should also focus, as needed, on COVID-19 reporting and actions on COVID-19 cases in the workforce, communication and public-awareness strategies, project's labor management procedures, stakeholder engagement, grievance mechanism and compliance monitoring and reporting requirements, including on waste management, among others.

The Health and Safety specifications will include the following provisions:

- Ensuring workplace health and safety standards in full compliance with Cambodia regulations and guidelines, at a minimum, and including (1) basic safety awareness training to be provided to all persons as well as on COVID-19 prevention and related measures; (2) all vehicle drivers to have appropriate licenses (3) safe management of the area around operating equipment inside or outside hospitals and laboratories; (4) workers to be provided with PPE equipment as needed (particularly facemask, gowns, gloves, hand washing soap, and sanitizer) to protect from COVID-19; (5) first aid equipment and facilities to be provided

in line with the ESMP guidelines on OHS; (6) at least one supervisory staff trained in safety procedures to be present at all times when construction work is in progress; and (7) adequate provision of hygiene facilities (toilets, hand-washing basins), resting areas etc., separated by gender as needed and with distancing guidelines in place;

- Complying with Cambodia legislation, WB's ESS2 requirements and other applicable requirements which relate to OHS hazards, including WHO specific COVID-19 guidelines:
    - All workplace health and safety incidents to be properly recorded in a register detailing the type of incident, injury, people affected, time/place and actions taken, including COVID-19 cases in the workforce, which should be reported to NIPH, Ministry of Health and the World Bank immediately;
    - All workers (irrespective of contracts being full-time, part-time, temporary or casual) to be covered by insurance against occupational hazards and COVID-19, including ability to access medical care and take paid leave if they need to self-isolate as a result of contracting COVID-19;
    - Procedures confirming workers are fit to work, which may include temperature testing and refusing entry to sick workers (with insurance in place to cover payment, as described above); All work sites to identify potential hazards and actions to be taken in case of emergency;
    - Any on-site accommodation to be safe and hygienic, and with distancing guidelines in place, including provision of an adequate supply of potable water, washing facilities, sanitation, accommodation and cooking facilities;
    - Workers residing at site accommodation to receive training in prevention of infection through contaminated food and / or water, malaria prevention if relevant, COVID-19 prevention and avoidance of sexually transmitted diseases;
    - Provide laminated signs of relevant safe working procedures in a visible area on work sites, in English, Cambodia and local language as required, including on hand hygiene and cough etiquette, as well as on symptoms of COVID-19 and steps to take if suspect have contracted the virus;
    - Construction materials manufactured in Cambodia be procured only from suppliers able to certify that no forced labour (including debt bondage labour) or child labour (except as permitted by the Labour Law) has been used in production of the materials;
    - All employees to be aware of their rights under the Labour Law, including the right to organize; and all employees to be provided training on appropriate behavior with

communities, gender-based violence and violence against children (also see Codes of Conduct).

3.3.4.2 Age of Employment

For this project, the minimum age will be 18 years. This rule will apply for both national and international workers. Workers will be required to provide proof of their identify and age before commencing any works on site.

3.3.4.3 Terms and Conditions and Equal Opportunities

All terms and conditions as outlined in the World Bank Environmental and Social Framework (ESF) ESS2, paragraphs 10 to 15 apply to contracted workers. In addition,

- The normal hours of work of a project worker shall not exceed 8 hours a day or 48 hours a week (Labour Code, Article 104). Hours worked in excess of the normal hours of work shall not exceed 12 hours a week and shall entitle a worker to a proportionate increase in remuneration.
- The wages paid by the employers to the workers shall be set at the appropriate market rate.
- All workers to be covered by insurance against occupational hazards and COVID-19, including ability to access medical care and take paid leave if they need to self-isolate as a result of contracting COVID-19.
- Fair and non-discriminatory employment practices, including equal pay for equal work regardless of gender and ethnicity;
- Provide PPE as suitable to the task and hazards of each worker, without cost to the worker;
- Under no circumstances will contractors, suppliers or sub-contractors engage forced labor or people under the age of 18;
- All employees to be informed of their rights to submit a grievance through the Project Worker Grievance Mechanism (see Part 5 – Grievance Redress Mechanism).

The Annex 5 presents the Labor Management Procedures in details

3.3.5 Community Health and Safety Procedures

The procedures of collecting, transporting, preserving, and handling samples in the community is in accordance with the Ministry of Health's guidelines. Details are as follows.

Procedure for specimen collection, storage, and transport of COVID-19 specimens/samples is detailed in SOP on Specimen Collection for COVID-19 of NIPH, Annex 2.14. This SOP describes method for collecting, storage, and transport of sample/specimens for SARs-CoV-2, the virus that cause COVID-19. It also outlines material to be used and the procedure to be followed by lab staff

for the collection, storage, and transport of clinical samples to ensure that specimens arrive the laboratory safely and in condition suitable for testing. Sample to be collected are Nasopharyngeal Swab and Oropharyngeal Swab. For procedure to collect, storage, and transport the samples, please see detail in Annex 2.14.

For community health and safety, MOH has conducted education and communication campaign to educate people and disseminate information for preventing with COVID-19. Protective measures of 3 prevention: wear face mask, wash hand, and keep physical distancing and 3 don't: don't stay in close room with limited air blow, don't go or stay in a crowded place, and don't shake hand have been widely disseminated. In response to occurring events, government declared temporary closures of school and limited meeting of too many people that can lead to failure of social distancing. Instruction for use of PPEs during working with COVID-19 cases at community and home is detailed in the Annex 4 – Specific measures for COVID-19 infection prevention and control

4. MONITORING, SUPERVISION AND REPORTING

This section describes procedures and tools to monitor and supervise the implementation of mitigation measures and the compliance with environmental and safety standards/guidelines.

4.1 During Construction/renovation of BSL2 and BSL3 Laboratories

During the construction/renovation of the new BSL2 and BSL3 laboratory facilities, the Laboratory Facility Management Committee will be responsible for the day-to-day supervision of the implementation of the contractor on mitigation measures as specified in the ESCOPs. The contractor shall submit the contractor environmental management plan (CEMP) including ESCOPs to the Project Director prior to initiating the civil works.

The MOH qualified engineer team and PMD /safeguard focal person will monitor the contractor's compliance with the engineering design and CEMP/ESCOPs and ensure that the contractor incorporate the status of ESMP/ESCOPs implementation into the monthly civil work progress reports. The MOH engineer team assigned to be in charge of site monitoring and supervision during construction/renovation phase.

4.2 During Operation of new BSL2 and BSL3 Laboratories

Biosafety and biosecurity team are assigned to routinely monitor and supervise the biosafety and biosecurity using a standard checklist developed by the team. In addition to routine monitoring and supervision, the team will periodically conduct the biosafety and biosecurity internal audit by using international standard checklist (see Annex 7) to identify any nonconformity (or potential nonconformity) to the standards which may cause other potential risks, particularly on the environment and human. The audit will provide objective evidences for management team to make

an efficient and effective preventive measures to stop and minimize those potential risks. The result of monitoring and supervision of the biosafety and biosecurity team should be incorporated in the quarterly and semester monitoring report of laboratory operation prepared by laboratory operators and submitted to Ministry of Health and World Bank.

5. IMPLEMENTATION OF ESMP

5.1 Implementation Arrangement

This Environmental and Social Management Plan (ESMP) is prepared in response to the Environmental and Social Safeguard requirements under H-EQIP project and COVID-19 ERP project, specifically on the construction/renovation of NIPH's laboratory. It lists down potential environmental and social impacts that would occur during the construction/renovation and operation phases of the laboratory and proposes measures to mitigate the identified risks and impacts to an acceptable standard. NIPH management team and PMD shall ensure the implementation of mitigation measures at all phases including construction/renovation and operation phases. Biosafety and biosecurity team of NIPH will perform routing monitoring and supervision of the laboratory during installation and operation. Laboratory chief and laboratory staff will involve in the implementation of measures dealing with daily operation, especially with wastes and personnel safety measures. The contractor is responsible for implementing ESCOPs during construction/renovation period and ensure that workers are aware of the internal rules and health safety measures and strictly follow the occupational and health safety measures and the contractor's internal rules during their work at NIPH.

5.2 Budget for Implementation of ESMP

For the implementation of ESMP, a budget needs to be allocated for mitigation measures. Budget to cover the contractor's compliance with ESMP and ESCOPs shall be included in the bidding budget. The civil works supervision team and biosafety/biosecurity team will be responsible for monitoring and supervising the implementation of measures, and this will not require any budget given it is located within NIPH and MOH compounds. During operation, the budget to avail laboratory equipment, laboratory materials, and PPEs shall be covered by project budget.

5.3 Grievance Redress Mechanism

A grievance redress mechanism (GRM) needs to be established within the context/scope of this subproject. This GRM is established to address any complaints that may occur during the subproject implementation. If someone finds out that the project creates negative impact on the community, individual, or environment, s/he can raise a respective grievance and submit a complaint to the Grievance Redress Committee for solution. The GRM has 3 steps.

- Step 1: The complainant discusses respective grievance with the NIPH focal person for a solution;
- Step 2: If the complainant is not satisfied with the solution offered, s/he can raise the grievance to the Project Director (PD);
- Step 3: If both parties are not satisfied with the solution made by the PD, they can go for a legal recourse.

Step 1, 2, and 3 have no cost to the complainant.

The GRM for project workers

There will be a specific Grievance Redress Mechanism (GRM) for project workers as per the process outlined below. This considers culturally appropriate ways of handling the concerns of direct and contracted workers. Processes for documenting complaints and concerns have been specified, including time commitments to resolve issues. All project workers will be informed of the Grievance Mechanism process as part of their contract and induction package.

The process for the Worker GRM is as follows:

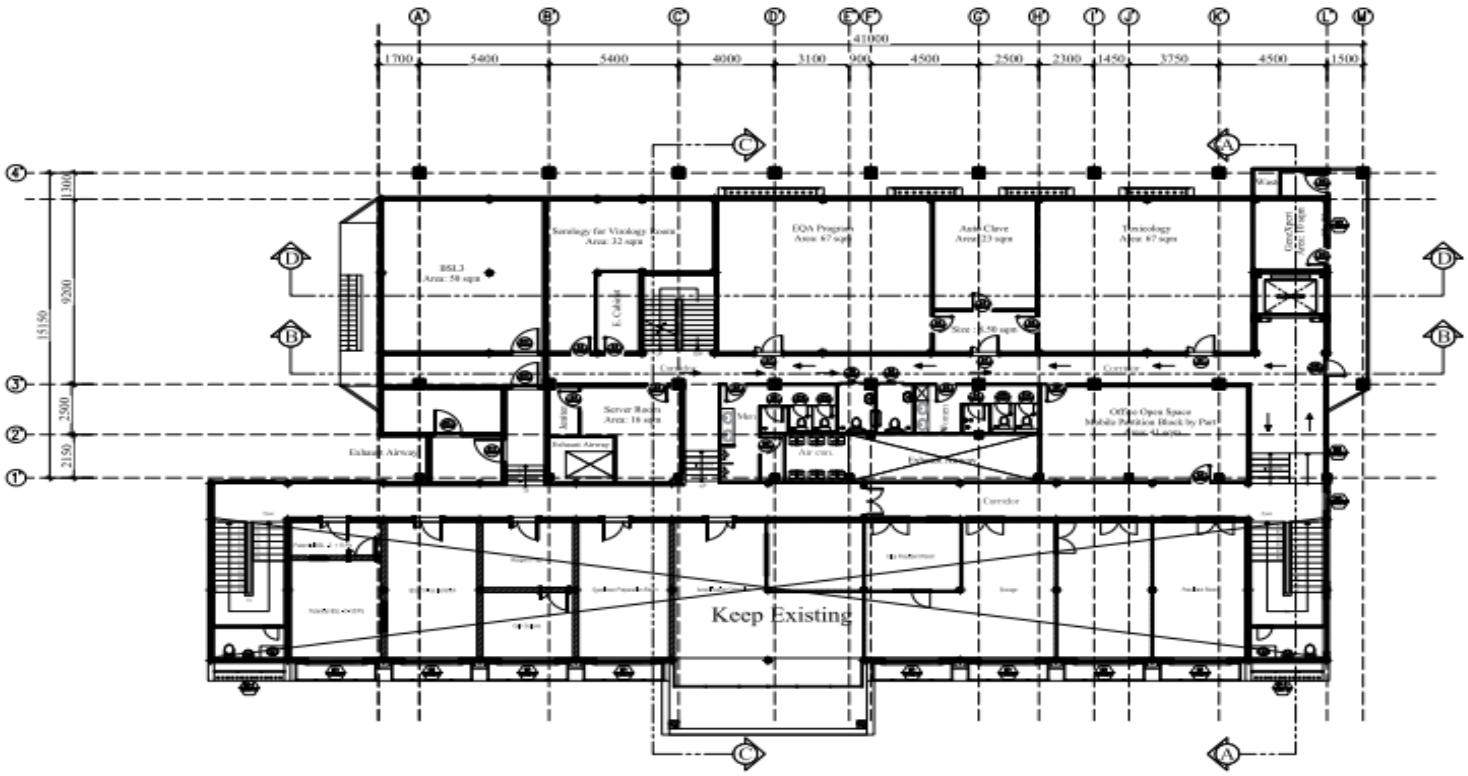
- The first step is that an Aggrieved Worker may report their grievance in person, by phone, text message, mail or email (including anonymously if required) to their direct Supervisor as the initial focal point for information and raising grievances. For complaints that are satisfactorily resolved by the Aggrieved Worker or Contractor, the incident and resultant resolution will be logged and reported to the NIPH's Social Focal Point.
- As a second step, where the Aggrieved Worker is not satisfied, the Supervisor (or the complainant directly) will refer the aggrieved party to the NIPH Social Focal Point. Grievances may also be referred or reported to the NIPH Management if appropriate. The NIPH Focal Point endeavours to address and resolve the complaint and inform the Aggrieved Worker as promptly as possible, in particular if the complaint is related to something urgent that may cause harm or exposure to the person. For complaints that were satisfactorily resolved by the NIPH Focal Point, the incident and resultant resolution will be logged by the NIPH Focal Point.
- As a third step, where the complaint has not been resolved, the NIPH Focal Point will refer to the Project Director for further action or resolution.

Up until the third stage there will be no fees for the lodgment of grievances. However, if the complaint remains unresolved or the complainant is dissatisfied with the outcome proposed by the Project Director, the Aggrieved Worker may refer the matter to the appropriate court, at the complainant's own expense. A decision of the Court will be final.

Each grievance record should be allocated a unique number reflecting year and sequence of received complaint (for example 2020-01, 2020-02 etc.). Complaint records (letter, email, record of conversation) should be stored together, electronically or in hard copy. The NIPH Focal Point

will be responsible for undertaking a regular (at least monthly) review of all grievances to analyze and respond to any common issues arising. The NIPH Focal Point is also responsible for oversight of the GRM.

ANNEX 1: DETAIL FLOOR PLAN DRAWING FOR CIVIL WORKS



Ministry of Health
Health Equity & Quality Improvement Project
IDA 5813 KH & MDTF: TFOA 3114

460 Sandach Pen Huth Blv.,
Sangkat Boeung Kak II, Khan
Tuolkork, Phnom Penh, Cambodia
Tel/Fax: +855-23 885 970 / 884 989

PROJECT NAME :
Renovation & Extension of MOH Lab

CODE : ...

HEALTH FACILITIES:
PROPOSAL PLAN OF MINISTRY OF HEALTH LABORATORY

REVISION :

REV.	DATE	DESCRIPTION
A		

DRAWN BY :

CHECKED BY :

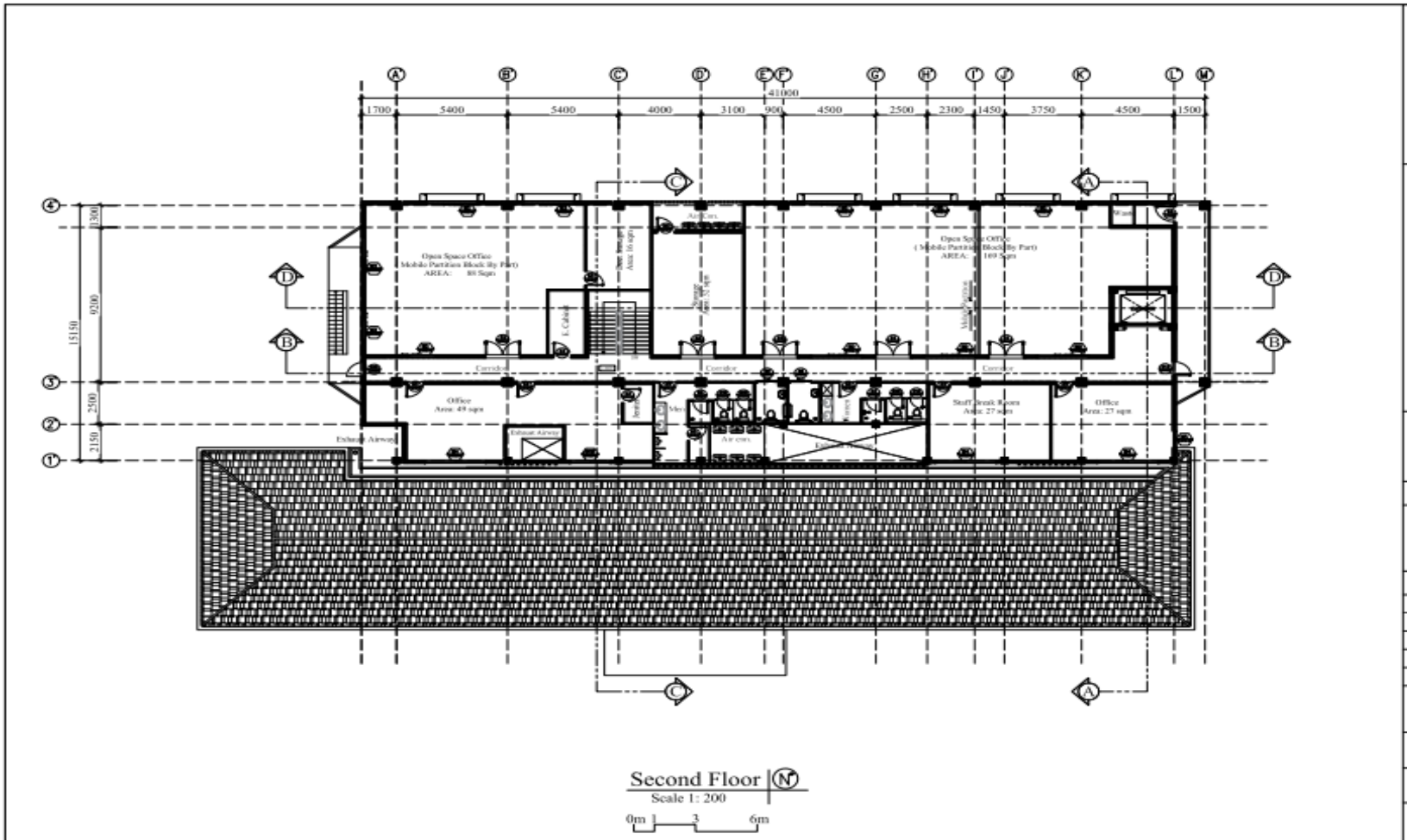
APPROVED BY :

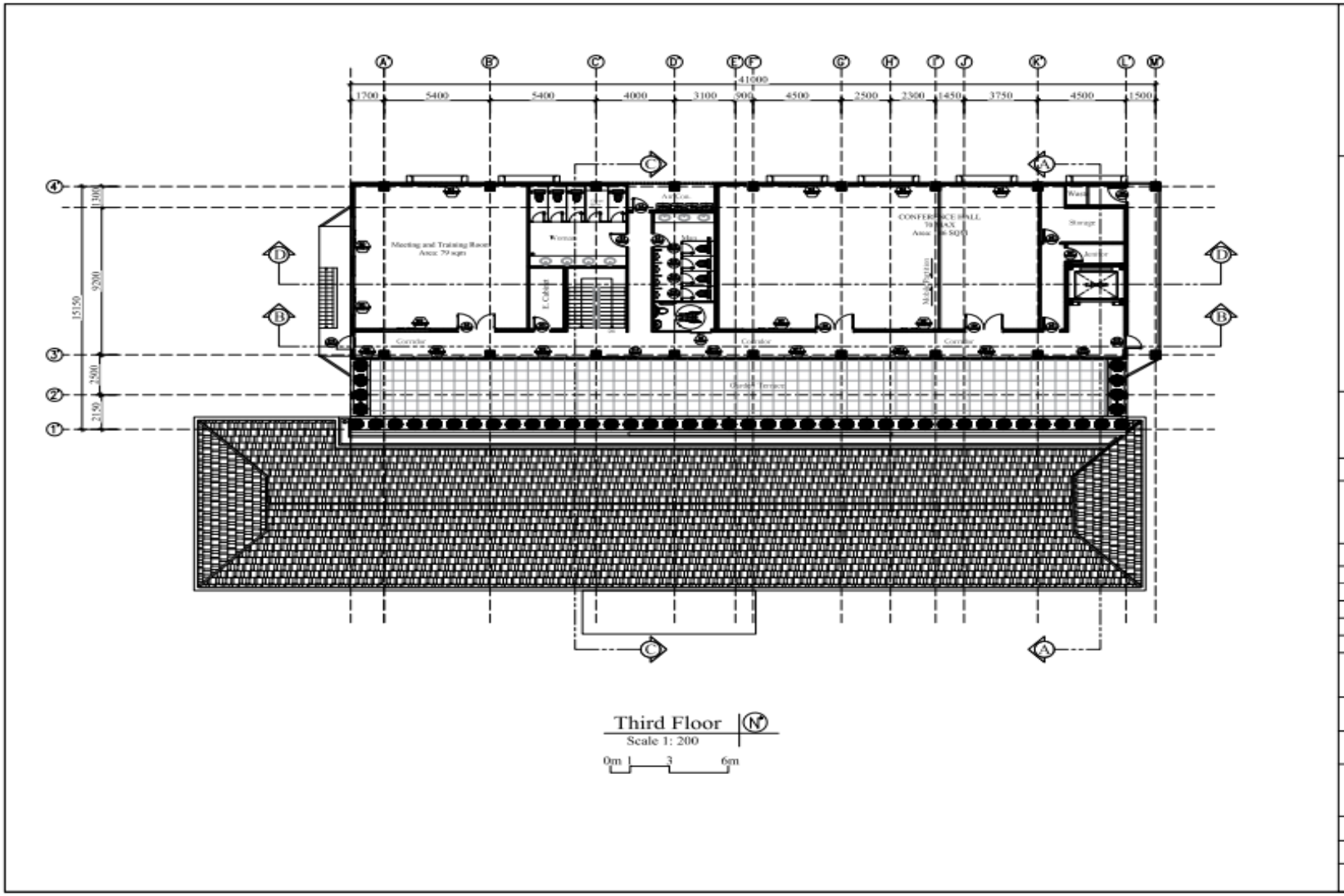
DRAWING TITLE :
FIRST FLOOR PLAN

DATE: JANUARY 2021

SCALE: 1:200 | FILE: FLOOR PLAN

DRAWING NUMBER:


Second Floor
Scale 1: 200
0m 1 3 6m
Ministry of Health
Health Equity & Quality Improvement Project
PROJECT NAME :
Renovation & Extension of MOH Lab
CODE :
HEALTH FACILITIES:
PROPOSAL PLAN OF MINISTRY OF HEALTH LABORATORY
REVISION :
DRAWN BY :
CHECKED BY :
APPROVED BY :
DRAWING TITLE :
SECOND FLOOR PLAN
DATE: JANUARY 2021
SCALE: 1:200
FILE:
DRAWING NUMBER:



Ministry of Health
Health Equity & Quality Improvement Project
IDA 5813 KH & MDTF: TF0A 3114

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PROJECT NAME :
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CODE : ...

HEALTH FACILITIES:
PROPOSAL PLAN OF MINISTRY OF HEALTH LABORATORY

REVISION :

REV.	DATE	DESCRIPTION
A		

DRAWN BY :

CHECKED BY :

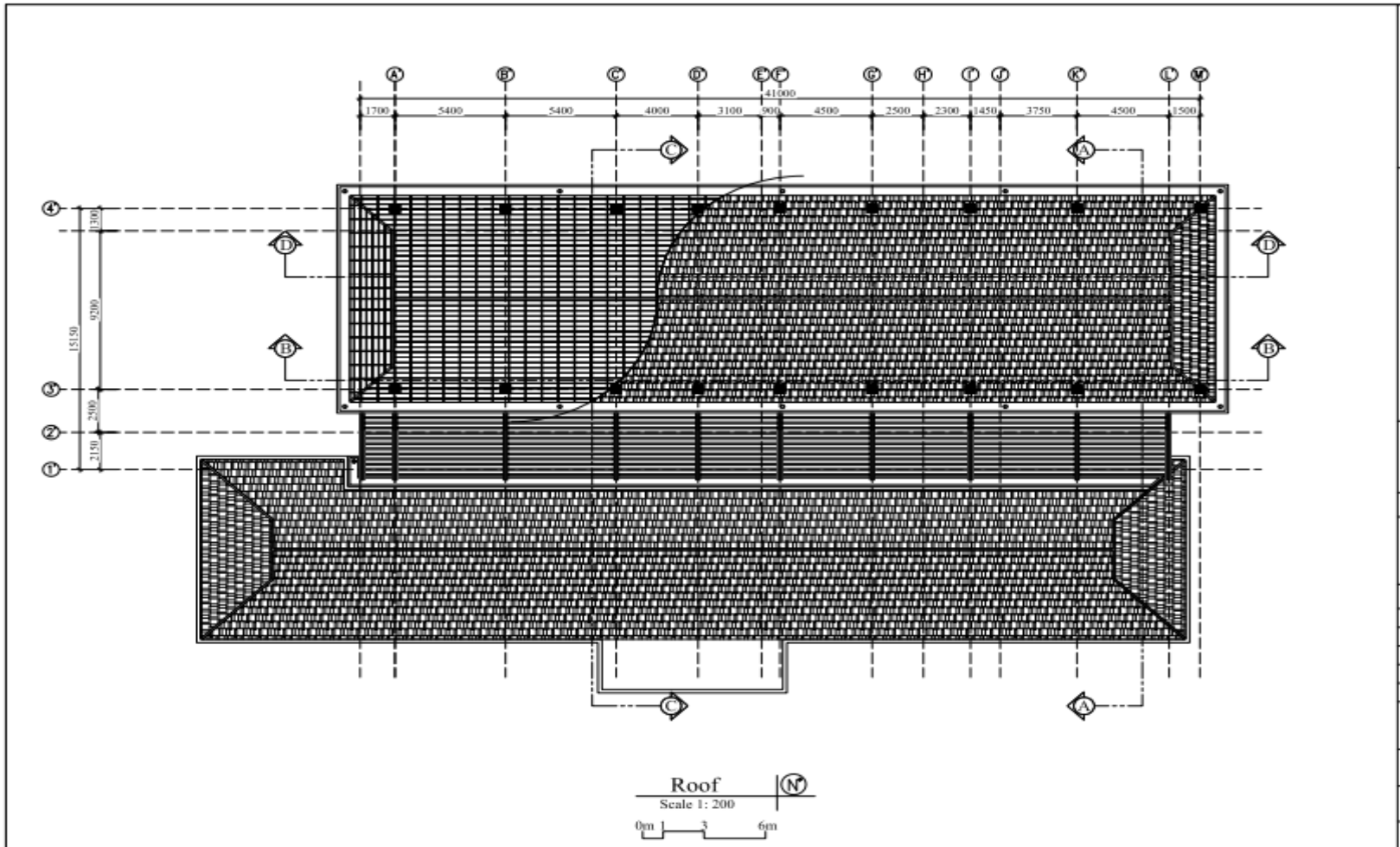
APPROVED BY :

DRAWING TITLE :
THIRD FLOOR PLAN

DATE: JANUARY 2021

SCALE: 1:200 | FILE: FLOOR PLAN

DRAWING NUMBER:



Ministry of Health
Health Equity & Quality Improvement Project
IDA 5813 KH & MDTF: TF0A 3114

450 Sandach Pen Nuth Str.,
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PROJECT NAME :
Renovation & Extension of MOH Lab

CODE : ...

HEALTH FACILITIES:
PROPOSAL PLAN OF MINISTRY OF HEALTH LABORATORY

REVISION :

REV.	DATE	DESCRIPTION
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DRAWN BY :

CHECKED BY :

APPROVED BY :

DRAWING TITLE :
ROOF PLAN

DATE: JANUARY 2021

SCALE: 1:200 | FILE: FLOOR PLAN

DRAWING NUMBER

ANNEX 2: STANDARD OPERATION PROCEDURE (SOPS) OF NIPH LABORATORIES

Annex 2.1: SOP-Personal Protective Equipment (PPE)

National Institute of Public Health

National Public Health Laboratory

PERSONAL PROTECTIVE EQUIPMENT (PPE)

SOP-ALL-01-008

Revision 01

Prepared by: Dr. NGUON VUTHY Date: 11 Dec 2017

(Deputy Head of biosafety Team)

Reviewed by: Mr. KEAT CHHEANGHENG Date: 15 Dec 2017

(Head of Biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 19 Dec 2017

(Chief of National Public Health Laboratory)

Issued Date: 27 Dec 2017

1. **Objective**

To ensure the proper uses standard PPE necessary to protect staff from biological and chemical hazards.

2. **Responsibility**

All NPHL personnel.

3. **Principle**

- Hazards exist in every clinical laboratory so strategies to protect laboratory staff are essential.
- When a hazard **cannot be removed or controlled adequately**, Personal Protective Equipment (PPE) may be used to protect laboratory staff.

4. **Material**

- Laboratory coat/ Gown/ Coverall
- Disposable gloves
- Shoe Covers
- Eye protection
- Hair cover
- Apron

Reagent: N/A

Standard and control: N/A

Sample: N/A

Procedure

There are many difference type of using PPE in laboratory. instructions for their use and maintenance are included in the text of the safety precautions in each SOP. The following describe how to wear PPE properly:

Protective clothing in the laboratory:

- All staff should wear a clean laboratory coat/gown/coverall.
- Clean laboratory coats should be hung in laboratory when not in use, DO NOT BRING LABORATORY COAT HOME.
- Laboratory coats should be cleaned and disinfected at appropriate intervals or if soiled (CLEANING LABORATORY COAT SOP) DO NOT WASH AT HOME.
- Disposable laboratory coats can be worn if available.

Protective clothing outside of laboratory in reception area, patient consultation rooms and phlebotomy room:

- Phlebotomist, physician and receptionist must wear clean laboratory coat

Coverall

- All staff should wear a clean coverall incase needed (Ex: COVID-19 or EBOLA outbreak).
- After coverall is being used, discard it into biological trash bin.

Face Protection

- Face shield and/or safety glasses/safety goggles should be worn when handling hazardous materials that can generate splash or aerosol

Gloves

- Disposable gloves should be worn for protection from chemicals, biological hazards, product contamination, sharps and abrasions.
- After disposable gloves are used they must be discarded in the biohazardous trash bin.
- Heat/cold protective gloves should be worn when handling hot and cold material.

Footwear

- All shoes worn in laboratory should be closed toed and ankle, open toed sandals are inappropriate and kept at the laboratory, DO NOT BRING HOME.
- Laboratory safety boots can be worn to clean large chemical or biological spills.

Eye and Respiratory Protection

- Wear face shield, safety glasses, and/or safety goggles and disposable surgical mask/ mask N95 respirator when required.
- **Hair cover**
- Wear hair cover to cover your hair and both side ears.
- After the hair cover was used it must be discarded in the biohazardous trash bin.

Apron

- Wear apron to cover your body.
- After apron is used it must be discarded in the biohazardous trash bin.

Reporting results: N/A

Normal Reference Range: N/A

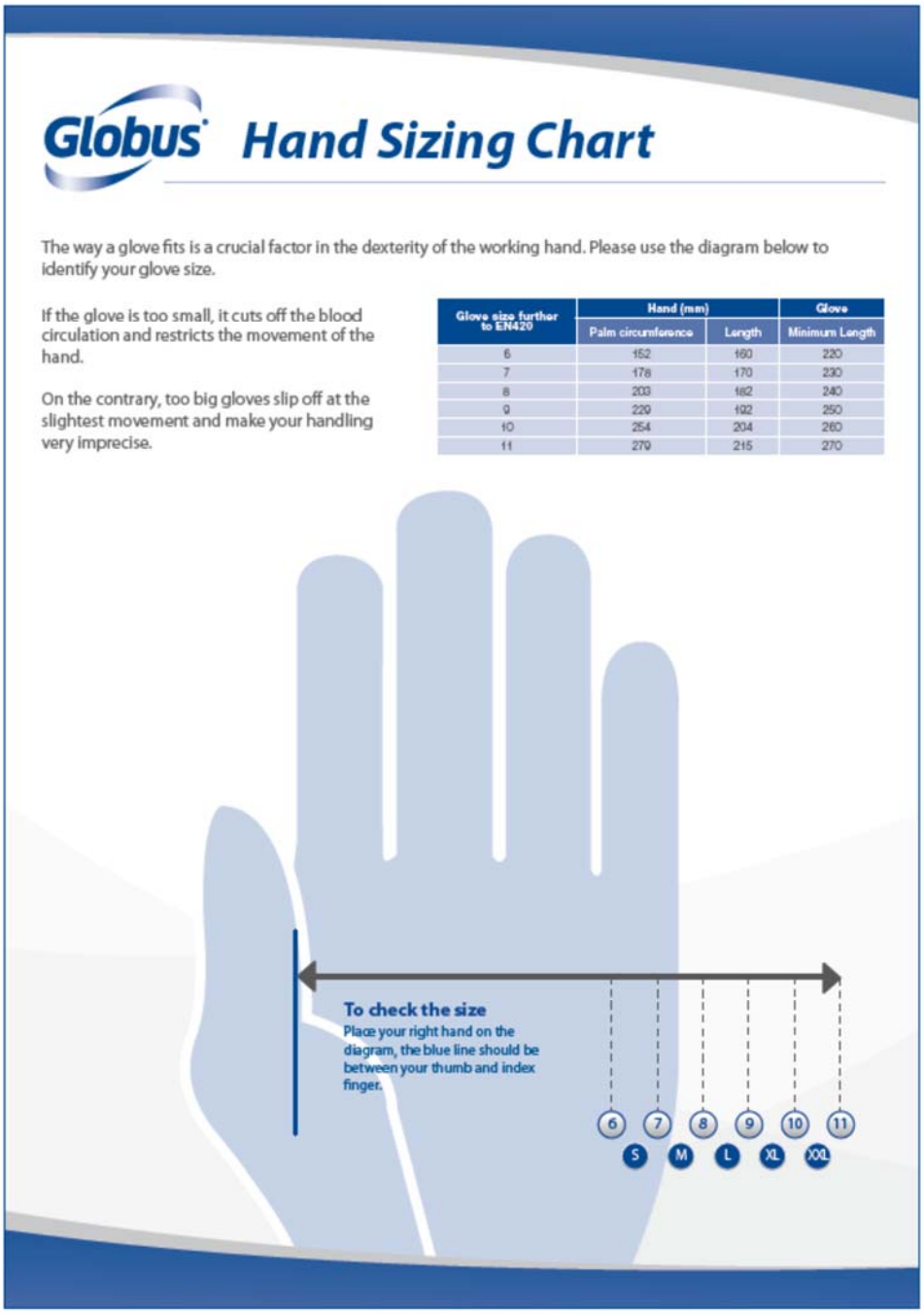
Reference

- ASEAN biosafety network establishment meeting (video PPE)
- http://www.free-training.com/osha/ppe/ppemenu.htm
- Infection Prevention and Control MOH guideline, 2018
- Biosafety and Biosecurity Guideline BMLS, March 2016

Safety precaution

Wear appropriate PPE while working in the laboratory and dispose it properly follow procedures.

Supplementary notes



Globus Hand Sizing Chart

The way a glove fits is a crucial factor in the dexterity of the working hand. Please use the diagram below to identify your glove size.

If the glove is too small, it cuts off the blood circulation and restricts the movement of the hand.

On the contrary, too big gloves slip off at the slightest movement and make your handling very imprecise.

Glove size further to EN420	Hand (mm)		Glove
	Palm circumference	Length	Minimum Length
6	152	160	220
7	178	170	230
8	203	182	240
9	229	192	250
10	254	204	260
11	279	215	270

Donning gloves

Hand hygiene
Select size, check for tears
Open glove at the cuff

Insert hand
Move fingers down into glove

Properly align glove

Ensure a snug fit

Roll cuff down wrist until secure

Repeat with second glove on other hand

slcpbiosafety@cdc.gov

Doffing gloves

Grasp glove near
the cuff. Fold over, peal away from hand

Carefully pull glove off
Turning it inside out

Hold the glove in the palm
of the still gloved hand

Remove 2nd glove placing
bare fingers inside the cuff

Do not touch gloves exterior.
Peel it off from the inside

Turn it inside out.
Envelope the other glove.

Pull off inside out.

Dispose of gloves safely
Perform hand hygeine

slcpbiosafety@cdc.gov

ដំណាក់កាលនៃការពាក់ PPE, BSL-2

National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-016	Revision No:00 Issued date: 30/03/2020
ការពាក់ឧបករណ៍ការពារខ្លួនក្នុងសុវត្ថិភាពជីវសាស្ត្រកំរិត ២ **(BSL-2)**		Revised date: N/A

ដំណាក់កាល	សំភារៈដែលត្រូវពាក់	រូបភាពសំភារៈ
១	សំអាតដៃជាមួយអាល់កុល៧០%ឬអាល់កុលជែល	
២	ពាក់អាវបំពង់ដែង (Gown)	
៣	ពាក់ម៉ាស់វះកាត់ (Surgical mask)	
៤	ពាក់ជីនតាសុវត្ថិភាពមានដង (Safety glasses)	
៥	ពាក់មួកគ្របសក់ (Hair cover)	
៦	ពាក់របាំងការពារមុខ	
៧	ពាក់ស្រោមស្បែកជើង	
៨	ពាក់ស្រោមដៃ (មួយជាន់)	

ដំណាក់កាលនៃការដោះ PPE, BSL-2

National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-017	Revision No:00 Issued date: 30/03/2020
ការដោះឧបករណ៍ការពារខ្លួនក្នុងសុវត្ថិភាពជីវសាស្ត្រកំរិត ២ **(BSL-2)**		Revised date: N/A

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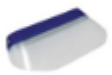
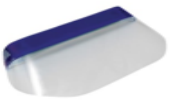
២	ដោះរបាំងការពារមុខ	
៣	ដោះអាវបំពង់វែង (Gown)	
៤	ដោះស្រោមស្បែកជើង	
៥	ដោះមួកគ្របសក់ (Hair cover)	
៦	ដោះវ៉ែនតាសុវត្ថិភាពមានដង (Safety glasses)	
៧	ដោះម៉ាសវះកាត់ (Surgical mask)	
៨	សំអាតដៃជាមួយអាល់កុល៧០%ឬអាល់កុលជែល	

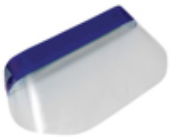
	National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-013	Revision No:00 Issued date: 30/03/2020
	ការពាក់ឧបករណ៍ការពារខ្លួនក្នុងសុវត្ថិភាពជីវសាស្ត្រកំរិត ៣ (BSL-3)		Revised date: N/A

ដំណាក់កាល	សំភារៈដែលត្រូវពាក់	រូបភាពសំភារៈ
១	សំអាតដៃជាមួយអាល់កុល៧០%ឬអាល់កុលជែល	
២	ពាក់ស្រោមដៃទីមួយ (ជាន់ទី១)	
៣	ពាក់មួកគ្របសក់និងត្រចៀក	
៤	ពាក់ម៉ាសចម្រោះខ្យល់ (Mask N95/3M)	
៥	ពាក់ឈុតអាវជាប់ខោ (Coverall)	
៦	រុំដៃអាវដោយស្អុតក្រដាស	
៧	ពាក់ស្រោមជើង	
៨	ពាក់ជីនតាសុវត្ថិភាពមានខ្សែ (goggles)	

៩	ពាក់អៀមផ្លាស្ទីក	
១០	ពាក់របាំងការពារមុខ	
១១	ពាក់ស្រោមដៃទី២ (ជាន់ទី២)	

ដំណាក់កាលនៃការដោះ PPE, BSL-3

	National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-014	Revision No:00 Issued date: 30/03/2020
ការដោះឧបករណ៍ការពារខ្លួនក្នុងសុវត្ថិភាពជីវសាស្ត្រកំរិត ៣ (BSL-3)			Revised date: N/A

ដំណាក់កាល	សំភារៈដែលត្រូវដោះ	រូបភាពនៃសំភារៈ
១	ដោះស្រោមដៃទី២	
២	ដោះរបាំងការពារមុខ	
៣	ដោះអៀមផ្លាស្ទឹក	
៤	ដោះវ៉ែនតាការពារភ្នែក (goggles)	
៥	ដោះស្រោមស្បែកជើង	
៦	ដោះស្តុតក្រដាសរុំដៃអាវ	 

๗	ដោះឈុតអាវជាប់ខោ (Coverall)	
๘	ដោះស្រោមដៃជាន់ទីមួយរួចលាងដៃជាមួយអាល់កុល๗๐%	 
๙	ដោះម៉ាស់ចម្រោះខ្យល់ (Aspirator mask: N95/3M)	 
๑๐	ដោះមួកគ្របសក់និងត្រចៀក	
๙๙	សំអាតដៃដោយល្បាយសំលាប់មេរោគ	

Annex 2.2: SOP-Biological Safety Cabinet (BSC) Operation and Maintenance

National Institute of Public Health

National Public Health Laboratory

BIOSAFETY CABINET (BSC) OPERATION AND MAINTENANCE

SOP-IMM-04-016

Revision 00

Prepared by: Ph. UNG SEREY SOPHEAK Date: 20 Dec 2017

(Deputy Head of IMM Unit)

Reviewed by: Mr. AM CHANTHAN Date: 21 Dec 2017

(Head of IMM Unit)

Approved by: Dr. CHAU DARAPHEAK Date: 22 Dec 2017

(Chief of National Public Health Laboratory)

Issued Date: 29 Dec 2017

1. Objective

To provide staff an appropriate procedure for the operation and maintenance of the Biological Safety Cabinet (BSC).

2. Responsibility

All laboratory personnel in clinical laboratory (new OPD laboratory): are able to perform this procedure.

3. Principle

To protect personnel, product and the environment from exposure to biohazards and cross contamination during routine procedures.

4. Material

- Laboratory Coat
- Gloves
- Soft cloth, detergent, water, nylon scrubber
- Tissue

5. Reagent

- 70 % alcohol solution
- 5% bleach solution

6. Standard and control: N/A

7. Sample: N/A

8. Procedure

8.1. Operation (NU-540-300E)

8.1.1. To turn the unit on, press and hold the **ON** key until the blowers start

8.1.2. Move the window to the work position, lift it to the top dimple (by the mark as- shown in the picture below)

8.1.3. Wait until the green LED lights “airflow is steady”

8.1.4. The unit is ready for operation.

8.1.5. Press the BULB key to turn on or off the light

8.1.6. Press the outlet key to access the electricity in the chamber

Figure 1-5. Work Position

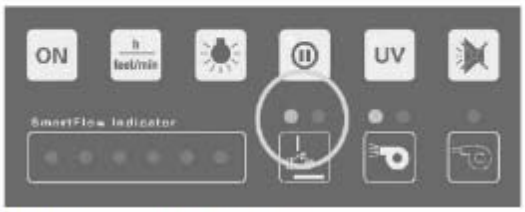


Figure 1-6. Lighted Green LED

8.1.7. Place needed work materials into the work-area and avoid blocking the air-intake grill.

8.1.8. Load the work tray with samples.

Note: For extended breaks in experimental phases, switch the device to standby mode by pulling down and closing the window.

Warning: personnel, product and the environment protection are ensured only if the airflow system of the device is working properly. If the alarm system issues a failure message for more than a few minutes while the front window is in the work position, stop all applications that may jeopardize worker safety.

Working and Recommendations

During operation:

- Place samples only within the defined work area of the work tray.
- Do not place unnecessary items into the sample chamber.
- Use only disinfected and cleaned accessories for the work process.
- Do not cause air turbulence by quick hand, arm or body movements in the sample chamber or in front of the work opening.
- Do not place accessories into the sample chamber that cause air turbulence or emit excessive heat.
- Do not block air circulation at the ventilation slots of the work tray.

Proper sitting position

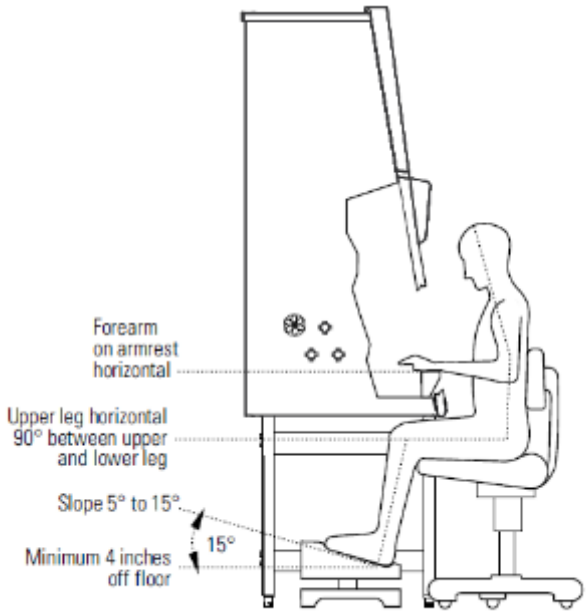


Figure 4-2. Sitting Posture

After completing a procedure

- Remove samples from the chamber and store them properly.
- Clean and disinfect work tray, window, chamber surface etc.
- Clean and disinfect all materials after use.

Note: use 70% alcohol solution to clean and disinfect BSC before and after routine operations. If using 5% bleach solution, the chamber must be rinsed again with water to avoid corrosion of chamber.

Harmful substance or pathogen spills on the surface of work area during a procedure must be cleaned up with a 5% bleach solution on the spill-spot and covered with paper towel, which is impregnated with 5% chloride for at least 15 minute.

8.1.9. Turn off unit

8.1.9.1. Pull the window down to the bottom dimple (to the mark as shown in the picture below)

8.1.9.2. Press and hold the ON key until the unit is shut down

8.2. Maintenance

Figure 1-7. Fully Closed Position (UV, if applicable)

Figure 1-8. Lighted Blue LED

8.2.1. Daily maintenance (after each run):

8.2.1.1. Disinfect the surfaces with 70% alcohol or 5 % bleach solution before and after use

8.2.1.2. Turn off the window alarm

8.2.2. Monthly maintenance:

8.2.2.1. Clean the exterior surface of the BSC with 70% alcohol solution and a paper towel.

8.2.2.2. Remove dirt/dust from the top outer surface using paper towel or a soft, clean cloth and 70% alcohol solution.

8.2.2.3. Lift the work tray to clean and remove dirt beneath the tray using 5% bleach solution with paper towel or soft, clean cloths. After using bleach, the BSC must be cleaned with water thoroughly after bleach solution to avoid corrosion. If this operation requires a lot of water, drain water out through the drain port, then dry thoroughly.

8.2.3. Technical maintenance and inspection:

8.2.3.1. BSC is certified every year by NAMRU-2.

9. Reporting results: N/A

10. Normal Reference Range: N/A

11. Reference

Instruction Manual Revision 6 (01.2016)

12. Safety precaution

- Failure to read, understand and follow the instruction in this Biological Safety Cabinet (BSC) Operation and Maintenance may result in damage to the unit, injury to operating personnel, and poor equipment performance.
- All internal adjustments and maintenance must be performed by qualified service personnel.
- Always use the proper protective equipment (PPE, etc.)
- Do not block the inflow of air to the BSC.
- Each individual is responsible for his or her own safety.
- Make sure wire is properly placed in the socket.

13. Supplementary notes

BSC Maintenance record form F-MCU-005

National Institute of Public Health National Public Health Laboratory	Document code: F-IMM-041	Prepared date: 11/Sep/17	Revision No: 00 Issued date: 02/Oct/17
TITLE: BSC maitenance records			Revised date: N/A

Equipement ID:_____ Month:_____ Year:_____

Model:_____ Responsible person:_____ Unit:_____

Serial N°:_____

Daily maintenance/ Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
☞Desinfection with 70% ethanol																															
☞Record down flow																															
☞Record In flow																															
☞Record pressure gauge if available																															
Performmance Factor, LED Indicator if available																															
☞Red																															
☞Yellow																															
☞Green																															
Performed by (staff initial)																															

Monthly	Date	Name
Lift and clean and desinfect under the work surface (with 70% ethanol)		
Clean outside surface with soft tissue paper or cloth		
Check drain valve		

Note: Desinfect before and after use. BSC : Range for inflow 105 and down flow 63

Note: Annually have the cabinet re-certified by a qualified certification technician

Date	Problem	Corrective action

Reviewed by:_____ Reviewed date:_____

Annex 2.3: SOP-Autoclave Prioclave

National Institute of Public Health

National of Public Health Laboratory

AUTOCLAVE PRIOCLAVE

SOP-ALL-01-029

Revision 01

Prepared by: Mr. KEAT CHHEANGHENG Date: 05 Sep 2019

(Head of Biosafety Team)

Reviewed by: Dr. NGUON VUTHY Date: 09 Sep 2019

(Deputy Head of biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 11 Sep 2019

(Chief of National Public Health Laboratory)

Issued Date: 17 Sep 2019

1. **Objective**

   To describe how to operate and maintain the Prioclave autoclave.

2. **Responsibility**

   - Laboratory technician and phlebotomist in OPD are responsible for sterilizing biohazardous waste using the Prioclave autoclave.
   - Biosafety Officer will provide training and maintain the autoclave log.

3. Principle

   - The Autoclave is used to sterilize or kill microorganism using steam and hot water. In clinical laboratories the autoclave is used for decontamination biohazardous waste or to sterilization laboratory equipment.
   - The backup autoclaves are located in Microbiology Unit.

4. **Materials**

   - Laboratory coat
   - Heat resistance gloves
   - Heavy duty face shield
   - Disposable gloves

5. **Reagents**

   - Water
   - Spore ampule
   - Chemical indicator tape

6. **Standard control**

Chemical Indicator tape.

Biological Indicator: Spore ampule.

Remarks: If the internal quality control fail after the cycle finished. The staff have to report the cycle again and record in Occurrence Report Form.

7. Sample: N/A

8. Procedure

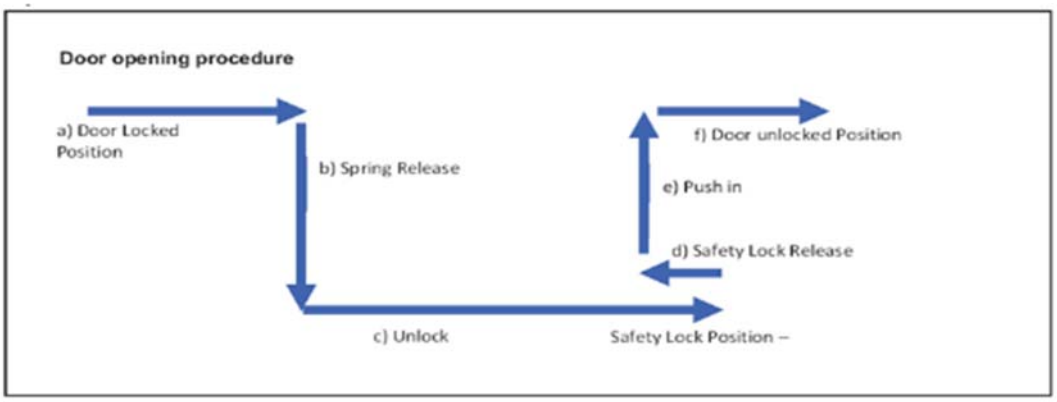
8.1 Operation

8.1.1. Check electricity supply is **ON**, and that the power is switched **on**.

8.1.2. Check the water supply is available and is turned **on**.

8.1.3. Open the autoclave door as described below:

Door opening procedure



a. Move the locking handle to the right
b. The handle will now spring out into its unlocking position
c. Move the handle fully to the right to unlock the door. The handle is now in its safety lock position, allowing any residue of pressure inside the autoclave to escape harmlessly.
d. Move the handle slightly to the right to release it from the safety position
e. Push the handle in as far as it will go
f. Move the handle fully to the right to its parked position

With the door unlocked, carefully lift to the door.

Take care whilst the door is open that it is fully open and does not fall. The door is heavy and could cause harm if it falls.

Top up with the water if necessary until the water level touches the water indicator tag on the load support plate.

ALWAYS CHECK THE WATER LEVEL BEFORE STARTING A CYCLE

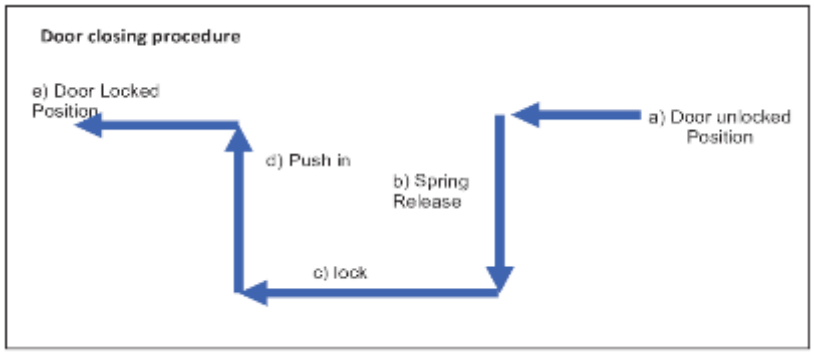
- Load the autoclave
- Set the temperature as required below for sterilization using the up/ down keys.
    - Please remember that the sterilizing temperature and time settings are use according to the research carried out by UK Medical research council which is recommended the following temperature and times as being sufficient for complete sterilization in autoclave:

      126 °C for 10 minutes.

      121°C for 30 minutes.

      115 °C for 30 minutes.
- Set the process time as required using the up/ down keys.
- Carefully lower the pressure door and secure as follows:

Door closing procedure



a. Move the locking handle to the left to release it from its parked position
b. The locking handle will now spring out to its locking position
c. Move the locking handle fully to the left to lock the autoclave door
d. Push the handle in fully against the spring
e. Move the handle fully to the left into its "park" position

Wait a few seconds for the **"start"** indicator to illuminate, and press the **"start"** button to begin the cycle.

Cycle Abort and Thermal Lock Override

- **Aborting a cycle**

  To abort the cycle at any stage, press the **"start"** Button

- **Thermal Lock Override**
  - **First abort the cycle as above.**
    - After checking that there is no pressure within the autoclave turn the thermal lock key to the right hold it there.
    - Press the "door" button once, keeping the thermal lock key held over.
    - Wait during the "Hold" display until there is a beep and the "Door" indicator illuminates.
    - Keep the key held and press the "Door" button once to unlock the door.
    - The key-switch can now be released and the door opened as above.
    - If the key is released at any stage the procedure must be repeated to open the door and reset the display.

8.2 Maintenance

8.2.1 Daily Maintenance

LOW and FILL level water level Probes

To ensure protection from boiling dry, the insulated section of the low water probe between stainless steel tip and the pressure vessel wall should be scrubbed clean to prevent it from being short circuited. The sensor tip should also be kept clean to ensure good contact.

8.2.2 Weekly Maintenance

Check exterior of machine and the inside walls of the pressure vessel for general cleanliness, particularly around operation parts and external switches and pins. Use anti-bacterial wipes to clean exterior paneling.

8.2.3 Monthly Maintenance

Check exterior of machine and the inside pressure vessel for general cleanliness, particularly around operation parts and external switches and pins. Wipe overall surfaces using clean damp cloth.

Bi-Annual Maintenance

Hinges

With the pressure lid in the open position the hinges should be cleaned and lubricated with high melting point grease.

Checking Temperature control and pressure gauge

During the **DWELL** stage of a running autoclave cycle when the **Process Time** has run for at least five minutes, check the reading shown by the temperature display against that of the steam Table in the manual.

Reporting results: N/A

Normal Reference Range: N/A

Reference

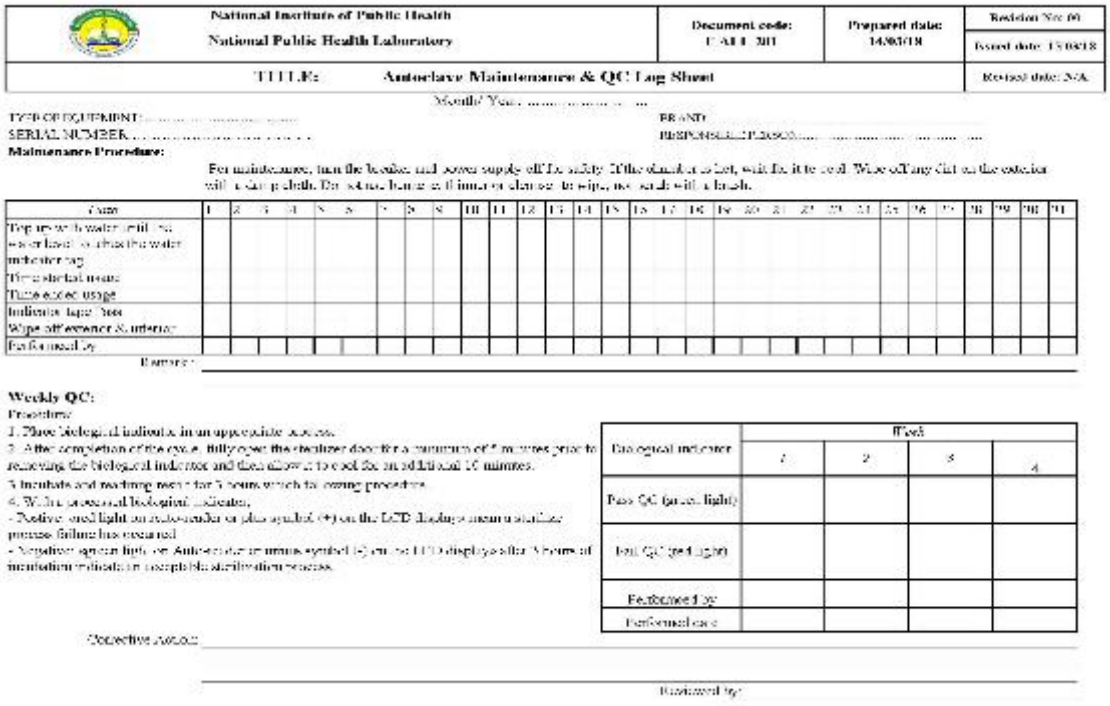
- Installation and Operating Manual Top Loading, Electrically Heated QCS Priorclaves. Priorclave. July 2014.

Safety precaution

- In case of running further cycles, please switch off the power and then switch on to reset system again.
- After autoclave the instrument still hot, wear PPE and heat protection glove to take items from the instrument.
- Do not touch surface outside of autoclave during run
- Wear proper PPE as the following:
    - laboratory coat
    - Glove
    - Cover shoe
    - Face shield

Supplement note

F-ALL-201: Autoclave Maintenance and QC Log Sheet



National Institute of Public Health National Public Health Laboratory	Document code: F-ALL-201	Prepared date: 14/03/18	Revision No: 00 Issued date: 15/03/18
TITLE: Autoclave Maintenance & QC Log Sheet			Revised date: N/A

Month/ Year: .....

TYPE OF EQUIPMENT: ..... BRAND: .....

SERIAL NUMBER: ..... RESPONSIBLE PERSON: .....

Maintenance Procedure:

For maintenance, turn the heater and power supply off for safety. If the chamber is hot, wait for it to cool. Wipe off any dirt on the exterior with a damp cloth. For stubborn burnt-on dirt or chamber interior, use a scrub with a brush.

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Top up with water until it is overflowed to check the water indicator tag																															
Time started steam																															
Time ended usage																															
Indicator tape/ Tube																															
Wipe off exterior & interior																															
Performed by																															

Remarks: .....

Weekly QC:

Procedure:

1. Place biological indicator in an appropriate location.
2. After completion of the cycle, fully open the sterilizer door for a minimum of 5 minutes prior to removing the biological indicator and then allow it to cool for an additional 10 minutes.
3. Incubate and reading result for 3 hours which following procedure.
4. Write down result biological indicator.

- Positive: red light on Autoclave or plus symbol (+) on the LCD display means sterilizer process failure has occurred
- Negative: green light on Autoclave or minus symbol (-) on the LCD display after 3 hours of incubation indicates acceptable sterilization process.

Biological indicator	Week			
	1	2	3	4
Pass QC (green light)				
Fail QC (red light)				
Performed by				
Performed on				

Corrective action: .....

.....

Reviewed by: .....

Annex 2.4: SOP-Fire Detection System Monitoring

National Institute of Public Health

National Public Health Laboratory

FIRE DETECTION SYSTEM MONITORING

SOP-ALL-01-028

Revision 00

Prepared by: Mr. NOV VANDARITH Date: 03 Jul 2018

(Member of BST and Microbiology Staff)

Reviewed by: Mr. KEAT CHHEANGHENG Date: 05 Jul 2018

(Head of Biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 06 Jul 2018

(Chief of National Public Health Laboratory)

Issued Date: 16 Jul 2018

1. **Objective**

   This SOP provides detailed instructions on how to monitor the laboratory fire detection system.

2. **Responsibility**

   Biosafety Team in NPHL.

3. **Principle**

   Fire alarm systems shall be regularly tested. Ensure that responsible persons are aware of the necessary fire alarm systems, including checking of their functionality and ensuring personnel awareness.

4. **Material**

   - Moving stair
   - EN-Air flow tester (CH 00216)

5. **Reagent:** N/A
6. **Standard and control:** N/A
7. **Sample:** N/A
8. **Procedure**

   a. **Fire Alarm**

      8.1.1. Inform to all staff in the Laboratory to know about the fire alarm testing.

      8.1.2. Press the button of fire alarm (red box) and activating alarm.

      8.1.3. Check and make sure that the alarm sounding to alert properly.

      8.1.4. How to stop the alarm after the testing:

         8.1.4.1. Go to the cabin controller at the door gate of NIPH, and press the screen button following the guidance below:

         8.1.4.2. Press the word **"Reset"**

         8.1.4.3. Typing password: **1234**

         8.1.4.4. Press **"OK"**

         8.1.4.5. Press the word **"Reset"**

         8.1.4.6. Press the word **"Silence"**

   b. **Automatic Smoke Detectors**

      8.2.1. Prepare the material including EN-Air flow tester (CH 00216) and moving stair.

      8.2.2. Define the location of Smoke detector.

      8.2.3. Use the EN-Air flow tester (CH 00216) for testing as follows:

         8.2.3.1. Break off both tips of the tube in the tube opener.

         8.2.3.2. Insert the tube tightly in the rubber bulb, the direction is irrelevant.

         8.2.3.3. Seal the hole in the rubber bulb with your thumb and squeeze the air from the bulb through the tube.

8.2.3.4. The tubed can be used repeatedly until visible smoke no longer emerges. Used tubes must be seal with the caps provided however, they should not be stored more than 3 days.

8.2.3.5. When tubes are reused, care must be taken to ensure that liquid sulphuric acid does not drop out of the caps onto skin or clothing. Observe the hazard and safety instruction on the packaging.

c. Automatic Access Door

8.3.1. Take two card access doors: one is activated and one is inactivated.

8.3.2. Test inactivated card to chip on control door and notice that the door is opened or not. If the doors are not open, it means the door is work properly. If it is not, need to take corrective action.

8.3.3. Test activated card to chip on control door and notice that the door is opened or not. If the doors are opened, it means the door is work properly. If it is not, need to take corrective action.

8.3.4. Testing all access control doors in order to make sure that it is worked properly in every three months.

9. Reporting results

Record the result into Fire Detection System Form Monitoring F-ALL-175

10. Normal Reference Range: N/A

11. Reference

Instruction Manual: EN-Air Flow Tester (CH00216), Edition10-05/ 2014.

12. Safety Precaution

Be careful when climb the ladder.

13. Supplementary notes

Fire Detection System Monitoring Form F-ALL-175

National Institute of Public Health National Public Health Laboratory	Document code: F-ALL-175	Prepared date: 02/Jul/18	Revision No: 00 Issued date: 08/Jul/18
TITLE: Fire Detection System Monitoring			Revised date: N/A

Buliding: Clinical OPD Lab (Building C) **Month:……..**

Note: the system must be checked monthly.

Date	Fire Alarm		Automatic Smoke Detectors		Automatic Access Door		Remedial Action Taken	Signature & name
	Building	Functioning Yes/No	Location	Functioning Yes/No	Location	Functioning Yes/No		
	C		Clinical Lab		Exit door of Clinical Lab			
			Waiting Area		Entry door of Clinical Lab			
			Phlebotomy		Calibration			
			QA		Main entry door			
			Calibration					
			Head of Lab					

Reviewed by:……

Reviewed date:……

Annex 2.5: SOP-Emergency Evacuation Plan

National Institute of Public Health

National Public Health Laboratory

EMERGENCY EVACUATION PLAN

SOP-ALL-01-026

Revision 01

Prepared by: Mr. KEAT CHHEANGHENG Date: 03 Sep 2019

(Head of Biosafety Team)

Reviewed by: Dr. NGUON VUTHY Date: 05 Sep 2019

(Deputy Head of biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 09 Sep 2019

(Chief of National Public Health Laboratory)

Issued Date: 17 Sep 2019

1. **Objective**:

The purpose of this document is to provide a clear exit plan in case of emergency such as fire.

2. **Responsibility:**

Biosafety Officer:

- Conducting regular fire drills
- Keeping the evacuation plan up to date
- Maintaining up to date emergency contact information

ALL NPHL personnel:

- Responsible for knowing what to do if an evacuation is necessary
- Ensure patients safety during an evacuation
- Practicing fire drills

3. **Principle**

Having an organized and practiced evacuation plan in case of an emergency ensures safety if an emergency should occur.

4. **Material:** N/A
5. **Reagent**: N/A
6. **Standard and control**: N/A
7. **Sample**: N/A
8. **Procedure**

a. Key Emergency personnel

Designated responsible official (Highest Ranking Manager at NIPH):

Name: Chau Darapheak/Phone number: 012 93 94 41

Emergency coordinator/Biosafety Officer:

Name: Biosafety Officer: Keat Chheangheng/Phone number: 011 85 47 66

Area monitors:

OPD patient area: Dr. Mam Sothoeurn/Phone: 011 86 32 36

OPD clinical Laboratory: Mr. Ung Sereysopheak/Phone: 012 669 045

Assistants for physically challenged:

Name: Mr. Or Channarith/Phone: 098 273 272

Name: Mr. Chheng Vannak/Phone: 012 416 948/096 819 1168

b. Evacuation routes are posted in every room near exit door. The following information is marked on evacuation maps

1. Emergency exits
2. Primary and secondary evacuation routes
3. Locations of fire extinguishers
4. Fire alarm pull stations' location

5. Assembly points

c. FIRE EMERGENCY is procedure:

i. Activate the nearest fire alarm near front and rear door in OPD by breaking glass of fire alarm (red box) and activating alarm. If the fire alarm is not available, notify the site personnel about the fire emergency by the following means yelling “fire”.

ii. Notify the local Fire Department (dial 118 or 666: fire rescue).

iii. Fight the fire ONLY if:

• The Fire Department has been notified.

• The fire is small and is not spreading to other areas.

• Escaping the area is possible by backing up to the nearest exit.

• The fire extinguisher is in working condition and personnel are trained to use it.

iv. Upon being notified about the fire emergency, occupants must:

• Leave the building using the designated escape routes ensuring no one is left behind.

- QA staff ensure no one left in QA room or Director and calibration room
- Director check calibration room and QA room to confirm everyone has left
- Laboratory staff ensure all laboratory staff have exited
- OPD and phlebotomy staff ensure all NPHL personnel and patients exit the building check also in the restrooms before leaving.

• Assemble in the designated area: car parking area under sign "EMERGENCY ASSEMBLY POINT".

• Remain outside until the Designated Official or designee announces that it is safe to reenter the OPD.

v. Designated Official, Emergency Coordinator or supervisors must:

• Determine a rescue method to locate missing personnel.

• Provide the Fire Department personnel with the necessary information about the facility.

vi. All NPHL OPD personnel must:

• Ensure that all employees have evacuated the area/floor.

• Report any problems to the Emergency Coordinator at the assembly area.

vii. Assistants for the physically disabled should:

• Assist all physically disabled patients in emergency evacuation using OPD wheel chair and lifting the physically disabled patient down the front stairs of the OPD and to the evacuation point.

d. EXTENDED POWER LOSS EMERGENCY

i. In the event of extended power loss to a facility certain precautionary measures should be taken depending on the geographical location and environment of the facility:

• Unnecessary electrical equipment and appliances should be turned off in the event that power restoration would surge causing damage to electronics and effecting sensitive equipment.

e. Chemical Spill

Every unit has its own chemical spill kit with necessary PPE and SDS.

i. When a Large Chemical Spill has occurred:

• Immediately notify the Biosafety Officer or member of Biosafety team.

• Contain the spill with available equipment (e.g., pads, booms, absorbent powder, etc.).

• Secure the area and alert other laboratory unit personnel.

• Do not attempt to clean the spill unless trained to do so.

• Attend to injured personnel and contact OPD medical doctor, if required.

• Evacuate building as necessary

ii. When a Small Chemical Spill has occurred:

• Notify the Biosafety Officer or member of Biosafety team.

• If toxic fumes are present, secure the area (with caution tapes or cones) to prevent other personnel from entering.

• Deal with the spill in accordance with the instructions described in the SDS.

• Small spills are handled in a safe manner, while wearing the proper PPE.

• Review the general spill cleanup procedures.

f. Severe weather and natural disasters

i. Earthquake:

• Stay calm and await instructions from the Biosafety Officer.

• Keep away from overhead fixtures, windows, filing cabinets, and electrical power.

• Assist people with disabilities in finding a safe place.

• Evacuate as instructed by the Biosafety Officer.

ii. Flood:

If indoors/house:

• Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.

• Follow the recommended primary or secondary evacuation routes.

If outdoors:

• Climb to high ground and stay there.

• Avoid walking or driving through flood water.

• If car stalls, abandon it immediately and climb to a higher ground.

9. **Reporting results:** N/A
10. **Normal Reference Range:** N/A
11. **Reference**

    CDC Emergency Action Plan (Template). 2004. https://**www.cdc.gov**/niosh/docs/2004-101/emrgact/emrgact.pdf
12. **Safety Precautions:** N/A
13. **Supplementary notes**

- Emergency exit of building C Ground floor : F-ALL-120
- Emergency exit of building A & B Ground floor : F-ALL-121
- Emergency exit of building A & B First floor : F-ALL-122
- Map of direction from building C to emergency assembly point: F-ALL-123
- Map of direction from building A & B to emergency assembly point: F-ALL-124

Annex 2.6 : SOP-Sample Packing and Transportation

National Institute of Public Health

National Public Health Laboratory

SAMPLE PACKING & TRANSPORTATION

SOP-ALL-00-023

Revision 01

Prepared by: PA KIMSORN Date: 14 Apr 2020

(Quality Manager)

Reviewed by: Mr. KEAT CHHEANGHENG Date: 24 Apr 2020

(Head of Biosafety Unit)

Approved by: Dr. CHAU DARAPHEAK Date: 12 Apr 2018

(Chief of National Public Health Laboratory)

Issued Date: 20 Apr 201

1. **Objective**

To ensure that laboratory sample are packed and transported in a proper packaging system to provide the highest level of safety and quality of sample during transportation.

2. **Responsibility**
    - National packing & transportation: Laboratory personnel.
    - International packing & transportation: Shipping Company with IATA license.
3. **Principle**

Procedure for monitoring the transportation of sample ensure laboratory sample are transported within a time frame appropriate to nature of request examination and the laboratory discipline concerned, within the temperature interval specified for sample collection and handling and with the designated preservative to ensure the integrity of sample and in a manner that ensures the integrity of the sample and the safety for the carrier, the general public and the receiving laboratory in compliance with establish requirement.

4. **Material**
    - Primary receptacle: Specimen container
    - Secondary shipping container: Zip lock bag or box
    - Outer shipping container: Cooler box or appropriate container with closed lid and biohazard label
    - Ice pack or Dry Ice if necessary
    - 70% alcohol(ethanol)
5. **Reagent:** N/A
6. **Standard and control**: N/A
7. **Sample**: N/A
8. **Procedure**

Sample are packed by using triple package systems for either local or international shipping.

a. **Local packaging and from OPD to other units in NPHL:** the process of three package systems are:

i. Sample is collected and put in sample container (primary receptacle). Make sure that the container will not leak, and close the sample cap tightly.

ii. Then sample containers are kept in a zip lock bag or box with closed lid and biohazard labels (secondary container). Put absorbent material on the bottom of the container to absorb fluid in case of breakage.

iii. Finally place secondary container in cooler box or appropriate container box with closed lid (outer shipping container) labeled with biohazard symbol. Attach specimen request form to the outer container. Use plastic scot tap to seal the container properly, and disinfection the container with 70% alcohol/ethanol

iv. F- ALL- 062: Specimen Shipping Form will be used for transportation from NHL laboratory to other referral laboratory.

b. International shipping: Sample shipped internationally are packaged by a company with an IATA license using the international Triple package system with required documents (packing invoice , authorization letter , delegation of shipper to company ship out, custom declaration and entry permitted letter)

c. Decontaminating shipping packages for use:

Before packaging can be reused it must be appropriate disinfected with 70% alcohol or 0.1 % bleach.

Note: Triple package system consists of three layers which describe as below:

- Primary receptacle: A primary watertight, leak-proof receptacle containing the specimen. The receptacle is packaged with enough absorbent material to absorb all fluid in case of breakage.
- Secondary packaging: A second durable, watertight, leak-proof packaging to enclose and protect the primary receptacle(s). Several cushioned primary receptacles may be placed in one secondary packaging, but sufficient additional absorbent material shall be used to absorb all fluid in case of breakage.
- Outer packaging: Secondary packaging is placed in outer shipping packaging with suitable cushioning material. Outer packaging protects their contents from outside influences, such as physical damage, while in transit. Each completed package is normally required to be correctly marked, labeled and accompanied with appropriate shipping documents (as applicable).

9. Reporting results: **N/A**

10. Normal Reference Range: N/A

11. Reference

- IATA infectious substances shipping guideline 10th edition, January 2009.
- Guideline on regulations for the transport of infectious substances 2009-2010, World Health Organization.
- ISO 15189, Medical Laboratory- Requirements for quality and competence, Third edition, 2012-11-01.

12. Safety Precautions

All necessary PPE should be worn when packing and transporting samples.

13. Supplementary notes

a. Label

- **Figure 1: Biohazard sign**

- **Figure 2:** Hazard label for Category A infectious substances and for genetically modified microorganisms and organisms that meet the definition of an infectious substance, Category
- **Figure 3:** Hazard label for certain noninfectious genetically modified microorganisms and organisms (UN 3245) and for carbon dioxide, solid (dry ice) (UN 1845); substances packed in dry ice (see section on Refrigerants) shall bear this label in addition to the primary risk label (e.g. the label shown in Figure 3 for Category A infectious substances
- **Figure 4:** Orientation label to indicate position of closures on the primary receptacles; for the air transport of quantities of liquid infectious substances in Category A that exceed 50 ml per primary receptacle, this label shall be affixed to two opposite sides of the package with the arrows pointing in the right direction, in addition to the label shown in Figure
- **Figure 5:** UN 3373, are human or animal materials that are being transported only for the purpose of diagnosis or investigation.

Figure 1

Figure 2

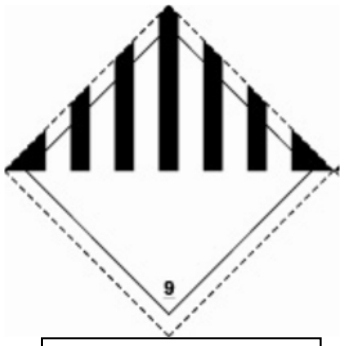


Figure 3

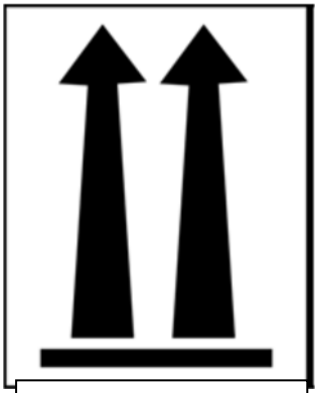


Figure 4

Figure 5

Annex 2.7: SOP- Waste Management

National Institute of Public Health

National Public Health Laboratory

WASTE MANAGEMENT

SOP-ALL-01-010

Revision 00

Prepared by: Mr. KEAT CHHEANGHENG Date: 06 Nov 2017

(Head of Biosafety Team)

Reviewed by: Dr. NGUON VUTHY Date: 08 Nov 2017

(Deputy Head of biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 17 Nov 2017

(Chief of National Public Health Laboratory)

Issued Date: 27 Nov 2017

1. **Objective**

   To provide information on how to properly segregate and dispose of waste in the laboratory.

2. **Responsibility**

   Biosafety Officer:

   - Maintaining up to date guidance pertaining to disposal of biohazardous waste.
   - Addressing questions or concerns pertaining to biohazard waste disposal.

   Laboratory personnel:

   - Responsible for safe and proper segregation and disposal of waste in their respective units.

3. **Principle**

   The segregation of waste is the first important step in handling waste. Decontamination of biohazardous waste is a critical second step. There are four categories of waste in the laboratory; non-hazardous, biohazardous, sharps and chemical.

4. **Material**

   Labeled Waste bins

   Biohazard bags

   Regular Trash bags

   Sharps containers

5. **Reagent**: N/A
6. **Standard and control**: N/A
7. **Sample**: N/A
8. **Procedure**

General Requirements:

- Disposing of laboratory waste has the potential to expose laboratory personnel to contaminated items if handled incorrectly. Wear appropriate personal protective equipment (PPE) when handling laboratory waste. At a minimum when handling biohazardous waste, PPE will include a laboratory coat, eye protection, close toed shoes and gloves.
- Wash hands after handling laboratory waste and whenever leaving the laboratory.
- Each unit is responsible autoclaving their own waste.
- Unit personnel are responsible for unloading the autoclave after the run is completed.
- Autoclave rooms are for laboratory waste only. Do not place office waste or store equipment within this room. Autoclave bags are used for contaminated waste only

and never as storage bags. Autoclave tape is to be used only on items to be autoclaved and not for general taping purposes.

- Refer to the Autoclave SOP for details on how to package and handle items requiring autoclaving.
- Food or drink material is never taken into the laboratory, so empty food or drink containers should never be found inside ordinary trash bin inside laboratory or biohazardous waste bin.

8.1. Non-hazardous Waste/Ordinary Waste

- Documents, supply, chemical shipping containers and boxes taken into the laboratory that are not contaminated with chemical/biological material can be removed from the laboratory and placed into a ordinary waste receptacle for disposal.
    - All biohazard symbols and shipping warning labels on the containers or boxes listed above must be removed from any container prior to placing it into the general waste stream.
- Ordinary waste bins are clearly labeled and distinct from biohazardous waste bins.
- Ordinary laboratory waste is picked from all units by janitor placed into a large trash bin for pickup by a trash pickup.

8.2. Biohazardous waste

Contaminated Reusable Items

- Reusable glassware will be autoclaved in autoclave basket, be sure to add autoclave indicator and spore ampule.
- Do not mix reusable items with disposable waste.

Contaminated Waste – Soft Items

- Soft contaminated waste (PPE, boxes, tissue, laboratory surface pad, etc.) consists of material that doesn't have hard edges or the ability to break and create a sharp edge that can poke through an autoclave bag. This material is placed into a biohazard waste bin for autoclaving.
- All PPE (such as gloves, face mask, shoe covers) removed from its packaging/shipping box is treated as contaminated waste and autoclaved regardless if used or not.
- After waste is properly autoclaved and sterilized the autoclaved waste is stored in the waste storage area for pick up by Cambodian Red Cross to be incinerated.

Contaminated Waste – Hard Items

- Hard contaminated waste consists of material that could poke through an autoclave bag which isn't contained within an autoclave pan (pipette tips, serological pipettes, petri dishes, etc.).
- Unbroken glass tubes (test tubes, biological media tubes, glass vials, etc.) are placed in a autoclaved bag for autoclaving before disposal. Always loosen container caps to prevent tubes from exploding during autoclaving.
- The laboratory staff pack the waste and transfer to the container and take it to the autoclave room daily or as necessary or at least two or three time per week.

8.3. Sharps Waste

- Sharps contaminated waste consists of material with sharp edges that could easily penetrate an autoclave bag (scalpels, glass slides, needles, glass pipets, broken glass, etc.).
- The staff using the sharp container will indicate 75% of container using a marker to know when the sharp container is full.
- Ensure the sharp container is maximum 75% full and replaced with new sharps container (do not overfill).
- When sharps container is 75% full close the lid to the container and place in the waste storage area (NPHL waste room) for Cambodian Red Cross to pick up and incinerate. Do not place sharps material into autoclave bags.

8.4. Miscellaneous Waste and chemical waste

- Expired unused media plates which are heat sealed wrapped and uncontaminated should be taken out of the box and placed into a biohazard waste barrels, pail or can for disposal.
- Chemical waste disposal and management is contained in the chemical Waste Management SOP.

8.5 Decontamination and Disposal Procedures

All biohazardous non-sharp waste in autoclave able bag must be autoclaved prior to being placed in the waste storage facility for pick up by Cambodian Red Cross and incineration.

- Please contact biosafety officer if you need further guidance.

8.6 Documentation

- Autoclaved waste records must be maintained in a log book.
- All waste picked up by the Cambodian Red Cross must be logged.
- All deviations from this procedure need to be captured systematically so that tracking and trending reports can be generated. It is the responsibility of all laboratory personnel to report deviations from defined methods, or incidents that could impact the safety of personnel. The person who first identifies or is made aware of a

nonconforming event should document the occurrence and notify the laboratory team lead and biosafety officer.

9. **Reporting results**: N/A
10. **Normal Reference Range**:N/A
11. **Reference**

Laboratory Waste Disposal Operational Procedure. United States CDC, 2014.

12. **Safety Precautions**
    - Follow standard precautions as outlined in SOP
    - Use clearly marked containers for each type of waste as noted in this SOP to ensure optimal safety.
    - Locate containers in the immediate area of use.
    - Wear proper personnel protective equipment appropriate to the task when handling any regulated waste, including water resistant gloves.
    - Wash hands immediately after removing gloves.
13. **Supplementary notes**: N/A

Annex 2.8: SOP-Disposal and Decontamination of Sharp Wastes

National Institute of Public Health

National Public Health Laboratory

DISPOSAL AND DECONTAMINATION OF SHARPS

SOP-ALL-01-013

Revision 00

Prepared by: Mr. KEAT CHHEANGHENG Date: 04 Apr 2018

(Head of Biosafety Team)

Reviewed by: Dr. NGUON VUTHY Date: 06 Apr 2018

(Deputy Head of biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 12 Apr 2018

(Chief of National Public Health Laboratory)

Issued Date: 23 Apr 201

1. **Objective**

   The purpose of this document is to provide information and procedures to properly decontaminate and dispose of sharps waste in compliance with government guidelines.

2. **Responsibility**

   Biosafety Officer:

   - Maintaining up to date guidance pertaining to disposal of sharps.
   - Addressing questions or concerns pertaining to sharps disposal.

   Laboratory personnel:

   - Responsible for safe and proper disposal of sharps in their respective units.

3. **Principle**

   Safe disposal of sharps waste is an essential step in the management of hazardous laboratory materials. Proper management of sharps waste prevents personal injury, prevents contamination of personnel and the environment and ensures proper containment of laboratory and infectious waste during collection, transfer, and disposal.

4. **Material:** N/A
5. **Reagent**: N/A
6. **Standard and control**: N/A
7. **Sample**: N/A
8. **Procedure**

   Sharps are any object with corners, edges, or projections that when inappropriately handled or disposed are capable of cutting or piercing skin or regular trash bags or waste containers. Examples of sharps include:

   - Hypodermic needles, syringes, tubing
   - Blades (scalpels, razors)
   - Microscope slides and covers
   - Glass capillary tubes
   - Pasteur pipettes
   - Glass slides or cover slips
   - Laboratory glassware or plastic pipette tips contaminated with an infectious agent

- ‘Plasticware’ made from plastic polymers which shatter on breakage (culture flasks, petri dishes)
    - Please see supplementary note for visual and separation of sharps waste

Sharps Containers

All sharps containers must meet the following standards:

- rigid
- non-breakable and puncture resistant
- impervious to moisture and leak proof
- have lid
- with a universal biohazard label

Card board is acceptable for non-contaminated broken glassware or clean empty bottles and can be discarded with regular trash no need for decontamination.

Collection Procedures

- Sharps containers MUST BE stored near where the waste is generated and segregated from other waste.
- Sharps containers MUST NOT:

• be filled greater than 3/4 full

• be discarded in the regular trash

• contain free liquids, such as full culture tubes or filled syringes

Decontamination and Disposal Procedures

Decontaminate sharps by adding a 10% bleach solution to the sharps container prior to sealing and disposal (added solution should fill 10% of the containers volume). This will ensure no active biological material is being removed from the laboratory area when the containers enter the waste pick up area for incineration by the Cambodia Red Cross.

Important** If bleach solution is added then the container cannot be autoclaved.

- Please contact biosafety officer if you need further guidance.

9. **Reporting results**: N/A
10. **Normal Reference Range** :N/A
11. **Reference**

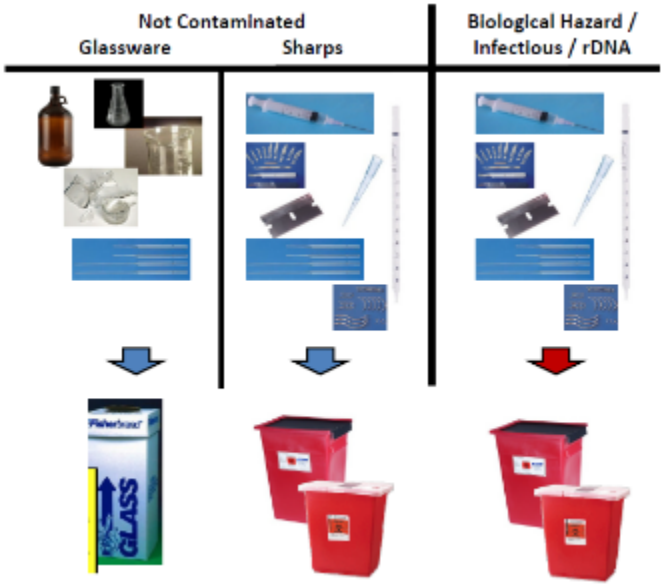
SOP for the disposal of sharp objects in laboratories. , University of Pennsylvania, 2012.

12. Safety Precautions

Use proper PPE to decontaminate and dispose of sharps.

13. Supplementary notes

Chart for the sorting of sharps waste.



Annex 2.9: SOP-Disinfection Solutions and Sterilization

National Institute of Public Health

National Public Health Laboratory

DISINFECTION SOLUTION AND STERILIZATION

SOP-ALL-01-017

Revision 00

Prepared by: Mr. NOV VANDARITH Date: 09 Jan 2018

(Member of BST and Microbiology Staff)

Reviewed by: Mr. KEAT CHHEANGHENG Date: 11 Jan 2018

(Head of Biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 15 Jan 2018

(Chief of National Public Health Laboratory)

Issued Date: 22 Jan 2018

1. **Objective**

   To describe the disinfection and sterilization processes that are essential to biosafety at NPHL.

2. **Responsibility**

   All NPHL personnel.

3. **Principle**

   Biological hazards are present in clinical laboratories however; the risk of exposure and subsequent infection by these agents can be significantly reduced using specific protocols for decontamination/cleaning/disinfection after spills, before working, and at the end of each shift. Specific decontamination requirements will depend on the type of work and the nature of the infectious agent(s) handled.

4. **Material**: N/A

5. **Reagent**

   Household Bleach

   Ethanol

6. **Standard and control**: N/A

7. **Sample**: N/A

8. **Procedure**

8.1 Types of Disinfectants:

Bleach (sodium hypochlorite):

Bleach, a fast-acting oxidant, is broad-spectrum chemical germicide. It is important to note bleach, is highly alkaline and can be corrosive to metal. Household bleach (original concentration 5% or 6%) should be prepared to the proper concentration and discard daily after use.

Recommended dilutions of chlorine for different purpose

Household bleach (Sodium hypochlorite)	**Concentration of Bleach Solution**	**How to dilution**	**Purpose**
5%	0.5%	1 part of household bleach with 9 parts of water	To disinfect spilled biological samples or highly concentrated biological materials (contact time at least 10 min)
	0.1%	1 part of household bleach with 49 parts of water	Daily surface disinfection (contact time at least 5 min)

6%	0.5%	1 part of household bleach with 11 parts of water	Disinfecting spill samples or high concentration materials (contact time at least 10 min)
	0.1%	1 part of household bleach with 59 parts of water	Surface disinfection for daily use (contact time at least 5 min)

8.2 Alcohols

Ethanol is effective against vegetative bacteria, fungi and lipid-containing viruses but not against spores. 70% alcohol (700 ml of alcohol add 300 ml Distilled water) is used for highest effectiveness, higher or lower concentrations may not be as germicidal. Alcohols do not leave any residue on treated items. Prepared alcohol solutions can be kept for one month in sealed container.

8.3 Dry Heat Disinfection and Sterilization

A sterilization oven can be used to sterilize re-usable laboratory glassware at temperatures of 160°C or higher for 2 to 4 hours.

8.4 Autoclaving

Autoclaving is the most effective and reliable means of sterilizing biohazardous waste. Material for autoclaving must be loosely packed in the chamber for easy steam penetration and air removal. All biological waste in NPHL must be autoclaved prior to Red Cross Pick up.

9. **Reporting results**: N/A
10. **Normal Reference Range**: N/A
11. **Reference**

Laboratory biosafety manual, third edition. Geneva, World Health Organization, 2004.

12. **Safety Precaution:** N/A

13. Supplementary notes

	National Institute of Public Health National Public Health Laboratory	Document code : JA-ALL-01-015	Revision No:00 Issued date: 30/03/2020
TITLE: DISINFECTION SOLUTION BLEACH AND ALCOHOL			Revised date: N/A

Recommended dilutions of chlorine for different purpose			
Household bleach (Sodium hypochlorite)	**Concentration of Bleach Solution**	**How to dilution**	**Purpose**
5%	0.5%	1 part of household bleach with 9 parts of water	To disinfect spilled biological samples or highly concentrated biological materials (contact time at least 10 min)
	0.1%	1 part of household bleach with 49 parts of water	Daily surface disinfection (contact time at least 5 min)
6%	0.5%	1 part of household bleach with 11 parts of water	Disinfecting spill samples or high concentration materials (contact time at least 10 min)
	0.1%	1 part of household bleach with 59 parts of water	Surface disinfection for daily use (contact time at least 5 min)

Table of amount ethanol water and water for final solution ethanol 70%		
% Ethanol	**Amount of ethanol added to make 1000 ml**	**Amount of water added to make 1000 ml**
99	707	293
98	714	286
97	722	278
96	729	271
95	737	263

Annex 2.10: SOP-Disposal of Chemical Waste

National Institute of Public Health

National Public Health Laboratory

CHEMICAL DISPOSAL

SOP-ALL-01-016

Revision 00

Prepared by: Mr. KEAT CHHEANGHENG Date: 10 Jan 2018

(Head of Biosafety Team)

Reviewed by: Dr. NGUON VUTHY Date: 12 Jan 2018

(Deputy Head of biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 15 Jan 2018

(Chief of National Public Health Laboratory)

Issued Date: 22 Jan 2018

1. **Objective**:

   The purpose of this document is to provide information and procedures to properly manage/dispose of chemical waste in compliance with government guidelines.

2. **Responsibility:**

Biosafety Officer:

- Maintaining up to date guidance pertaining to disposal of chemicals.
- Addressing questions or concerns pertaining to chemical disposal.

Laboratory personnel:

- Responsible for safe and proper disposal of chemicals in their respective units.
- Asking the biosafety team questions about chemical waste disposal when procedures are unclear.

3. **Principle** :

   Safe disposal of chemical waste is an essential step in the management of hazardous chemicals. Proper management of waste requires understanding how chemicals can be disposed of or neutralized.

4. **Material:** N/A
5. **Reagent**: N/A
6. **Standard and control**: N/A
7. **Sample**:N/A
8. **Procedure** :

General Comments about Chemical Waste Management:

- When you order a chemical, you have the responsibility for its disposal.
- Always label the date of opening on chemical bottle because many chemicals have limited shelf life. After which they decompose, give off fumes, absorb water or CO_2, or form peroxides. Watching the storage time can minimize disposal of "reactive" materials by disposing of them when they are stable.
- If you have any questions about chemicals or their proper disposal ask a biosafety officer.

Hazardous Characteristics

Chemicals which have the following four characteristics are considered to be **hazardous:**

IGNITABILITY

- A liquid which has a flash point of less than 60 deg C is considered ignitable by the EPA. This includes almost all organic solvents. Some examples are:Ethyl ether,

Methanol, Ethanol, Acetone, Toluene, Benzene, Pentane, Hexane, Skelly B, Xylene, Formaldehyde, Heptane, Ethyl Acetate, Petroleum Ether. Instructions for the disposal of organic solvents are given below.

CORROSIVITY

- An aqueous solution having a pH of less than or equal to 2, or greater than or equal to 12.5 is considered corrosive by the EPA. Instructions for the disposal of concentrated solutions of acids or bases are given below. Corrosive materials also include thionyl chloride, solid, sodium hydroxide and other nonaqueous acids or bases.

REACTIVITY

- Chemicals that react violently with air or water are considered reactive. An example is sodium metal. Reactive materials also include strong oxidizers, such as perchloric acids, and chemicals capable of detonation when subjected to an initiating source, such as old picric acid and phosphorous.
- Solutions of cyanide or sulfide that could generate toxic gases are also classified as a reactive

Other Hazardous Wastes

- Aqueous Solutions of Toxic Metals
- Special Precautions for Lead, Mercury and Silver
- Lead, mercury and silver require special precautions for disposal. If you discharge any of these metals, their compounds or aqueous solutions of their compounds into the sewer system, make sure you meet these concentrations:
- Lead 2.0 mg/l
- Mercury 0.02 mg/l
- Silver 0.4 mg/l
- Lead, mercury and silver are especially important pollutants. Filtering and precipitation for some other type of collection must be routine procedure for your laboratory if you use them.

Label large waste collecting containers in the laboratory and all chemical waste discard bottles:

- A label must be affixed to each container. You must list the major chemical components of your waste especially if it contains the following:
- Halogenated compounds (e.g., CHCl3 , CH2CL2, CCl4, and solutes)

- Metals (e.g., Pb, Hb, Ag, Cr)
- Sulfur compounds (e.g., CS2, DMSO, and solutes)
- Solvents

Disposal of Chemicals

Chemicals for the Normal Trash

You can safely dispose of many solid chemicals in the normal trash if the containers are tightly capped and of good integrity. Examples are given below:

- have oral rat LD50 toxicity values higher than 500 mg/kg and
- have no positive determination for carcinogenicity
- please read specific SDS sheet for the chemical if you are unsure

Chemicals for the Sanitary Sewer System

You can safely dispose of many chemicals into the sanitary sewer system if they are water soluble, degradable in the sanitary sewer and are properly diluted. Examples are given below. Chemicals in solid form should be followed by twenty (20) parts of water.

- Aqueous solutions of chemicals described under "chemicals for the normal trash"
- Very dilute aqueous solutions of water soluble organic solvents. (i.e., <10% solutions) Examples are:
    - Allyl Alcohol Propanol
    - Glycerine Propylene Glycol
- Neutralized solutions of acids or bases (see procedure below)

  *You should take special care when neutralizing strongly oxidizing acids such as perchloric acid and fresh chromic acid.
- Small amount of methanol can be disposed into the sink.

General Neutralization Procedures

CAUTION: FUMES AND HEAT ARE GENERATED

1. Do your neutralizations in a well-ventilated hood and behind a safety shield.
2. Keep containers cool while neutralizing.
3. You should be wearing an apron, goggles, and gloves.
4. Perform all steps SLOWLY.
5. Neutralize concentrated solutions of acids and bases to within a pH range of greater than 2 and lower than 12.5 and then flush them into the sanitary sewer with at least twenty (20) parts of water.

Acid Neutralization

While stirring, add acids to large amounts of an ice-water solution of base such as sodium carbonate (soda ash), calcium hydroxide (slaked lime), or 8M sodium hydroxide (for concentrated acids). When a pH above 2 is achieved, dispose of the solution into the sewer system followed by twenty (20) parts of water.

Base Neutralization

Neutralize by first adding the base to a large vessel containing water. Slowly add a 1M solution of HCL. When a pH of 12.5 is achieved, dispose of into the sewer system followed by twenty parts of water.

Solutions to be collected by the Biosafety Team for proper disposal:

Organic Solvents

Place your organic solvents in glass bottles the solvents originally came in. Don't put them in the sewer. Halogenated solvents (e.g., chloroform, carbon tetrachloride and dichloromethane) and their mixtures should be kept separate as they are more difficult to dispose of. Be sure to deface or remove original label and attach Chemical Discard tag to bottle and are shipped off for proper incineration contact Biosafety Team for proper disposal.

SUBSTANCES THAT SHOULD NOT BE PUT INTO SOLVENT WASTE CONTAINERS

The following substances are **inappropriate** for incineration. Don't put them into your organic waste containers. They should be collected in separate containers.

Solutions of acids or bases

Aqueous solutions of toxic organic chemicals

Metals (e.g., Sb, As, Ba, Cd, Cr, Pb, Hg, Ni, Se, Ag)

Vacuum pump oil

Sulfides or inorganic cyanides

Strong oxidizers or reducers

Water reactive substances

Unknowns

Large amounts of water

Peroxide Forming Agents

Peroxides are low power explosives and very sensitive to shock and heat. A variety of organic compounds react with oxygen from the air to form unstable peroxides. Well-known peroxide forming compounds include:

Diethyl Ether

Tetrahydrofuran

Isopropyl Ether

Other ethers

Other peroxide forming agents include:

Aldehydes

Compounds with benzylic hydrogens

Compounds with allyl groups

Vinyls

Peroxide Formation and Safety Tips

- Exposure of any of the peroxide-forming agents to light or air increase the rate of peroxide formation. Therefore, store these agents in full, light-tight containers.
- Refrigeration does not prevent peroxide formation
- Order small amounts frequently to decrease storage time.
- Date new containers when opened.
- Be particularly cautious with materials of unknown vintage. Do not attempt to remove caps from containers that may cause sparks. Call biosafety officer for advice or assistance when such containers are found.
- Never distill peroxide-forming solvents unless they are known to be free of peroxides.
- Peroxides concentrated in the residue can pose a serious explosion hazard.

Peroxide Testing and Disposal

- Before beginning work with a peroxide-forming agent, determine its peroxide content.
- Dispose of agents containing greater than 80 ppm peroxide. Easy-to-use quantitative peroxide test strips are available from Scientific Products or Aldrich.
- Materials found to contain peroxides (greater than 80 ppm) should be treated prior to disposal.
- Methods for removal of peroxides involve the addition of reducing agent such as ferrous sulfate (for diethyl ether peroxides) or sodium metabisulfite (for isopropyl peroxides).

- The treated solvent should be placed in a waste container and the empty container rinsed with water. Most peroxides are water soluble and the rinsate can be put in the sewer system.

Strong Oxidizers and Reducers

The best way to dispose of oxidizers and reducers is to chemically neutralize them. You should treat the chemicals listed below in your laboratory. For information on treatment techniques, please call us. If you choose not to neutralize these chemicals, contact biosafety officer for pickup and disposal.

STRONG OXIDIZERS

Chromic acid (fresh)

Metallic chlorates

Metallic nitrates

Metallic perchlorates

Metallic permanganates

Perchloric acid

STRONG REDUCERS

n-Butyl lithium Calcium hydride

Metallic sulfides Sodium hydride

Stannous chloride

Other Reactive (Including Water Reactive)

Listed below are a variety of reactive materials that you should **contact the biosafety officer** for disposal. Package any liquids separately from solids and please note special hazards and/or handling precautions on each box.

Acetyl chloride

Benzoyl peroxide

Bromine

Calcium metal

Lithium metal

Phosphorous (yellow)

Potassium metal

Sodium metal

Thionyl chloride

Unknown Chemicals

You must make every effort to provide an accurate description of all chemicals need to discard.

Unknown chemicals present serious problems for the NPHL. Without a description, we can't handle or dispose of a chemical in a safe manner. Disposal companies will not accept chemical waste without an analysis, and an analysis of one sample could easily cost $1,000.

- Investigation of Unknown Chemicals

Any information you can provide about an unknown chemical you wish to dispose of greatly aids identification. For example, even knowing whether or not a chemical is organic or inorganic is helpful.

- Procedure

Don't move it from its location if possible. A biosafety team member will come to your laboratory to investigate.

- Reducing the Problem

You can reduce the occurrence of unknown chemicals by being thorough in maintaining labels on chemical containers. Periodic review of chemical stock and careful record keeping lessens the chance of discovering containers with missing labels.

9. **Reporting results**: N/A
10. **Normal Reference Range**: N/A
11. **Reference**

    Waste Handling & Disposal SOP, University of Notre Dame, 2010.

12. **Safety Precautions:** N/A
13. **Supplementary notes**: N/A

Annex 2.11: SOP-Laboratory Risk Assessment

National Institute of Public Health

National Public Health Laboratory

LABORATORY RISK ASSESSMENT

SOP-ALL-01-004

Revision 00

Prepared by: Mr. KEAT CHHEANGHENG Date: 07 Dec 2017

(Head of Biosafety Team)

Reviewed by: Dr. NGUON VUTHY Date: 08 Dec 2017

(Deputy Head of biosafety Team)

Approved by: Dr. CHAU DARAPHEAK Date: 19 Dec 2017

(Chief of National Public Health Laboratory)

Issued Date: 27 Dec 20

1. **Objective:**

The objective of risk assessment is to determine the risks associated with laboratory procedures. Risk assessment allows a laboratory to determine the relative level of risk different laboratory activities pose and help guide risk mitigation/elimination decisions to remove unnecessary risks.

2. Responsibility

- Biosafety Team (BST) conduct risk assessment using the NPHL risk assessment checklist in each laboratory unit.

- Head of Unit will assist the BST while performing the risk assessment and follow up to ensure all staff in unit are following risk assessment guidelines.
- Laboratory staff in each unit will follow the biosafety risk assessment guidelines.

3. Principle

- Risk assessment is a procedure that analyzes a particular process or situation in order to determine the likelihood and consequences of a certain adverse event and is unique to each laboratory unit.
- To be comprehensive, a laboratory risk assessment should consider every activity and procedure conducted in a laboratory that involves infectious disease agents or hazardous chemicals as a possible risk.

4. Materials: N/A

5. Reagents: N/A

6. Standard control: N/A

7. Sample: N/A

8. Procedure

1. The BST contact the Head of Unit to obtain information the following information prior to conducting the risk assessment in a given unit:
    - List of testing procedure performed in unit, including all applicable safety practices
    - List of potential hazardous pathogens that could be encountered in the laboratory unit
    - Chemical hazards found in unit
2. Using the risk assessment tool (see supplementary notes) developed by NPHL, the BST will perform risk assessments for all laboratory procedures that might potentially expose laboratory workers to hazardous pathogens or chemicals.
3. The information gathered from the assessment will be used to determine avoidable or acceptable risks for each unit and to develop safety procedures to minimize risks.
4. A copy of every completed risk assessment shall be kept in the BST cabinet.

9. Reporting results: N/A

10. Normal Reference Range: N/A

11. Reference

- ISO 15189, Medical Laboratory-Requirements for quality and competence, Third edition, 2012-11-01.
- Sandia International Laboratory website: biosecurity.sandia.gov/gbrmc
- Risk assessment tool developed by Gerald J. Pellegrini Jr.,US-CDC

12. Safety precaution: N/A

13. Supplementary notes

Form and Code of form of Laboratory Biorisk Assessment tool: F-ALL-068

Annex 2.12: SOP-Personnel Management

To be added

Annex 2.13: SOP-Staff Training

To be added

Annex 2.14: SPECIMEN COLLECTION FOR COVID-19

National Institute of Public Health

National Public Health Laboratory

SPECIMEN COLLECTION FOR COVID-19

SOP-VIR-02-011

Revision 00

Prepared by: Mr. SOK SIYEATRA Date: 24 Apr 2020

(Deputy of Virology unit)

Reviewed by: Mr. CHIN SAVUTH Date: 25 Apr 2020

(Deputy Head of NPHL)

Approved by: Dr. CHAU DARAPHEAK Date: 26 Apr 2020

(Chief of National Public Health Laboratory)

Issued Date: 27 Apr 2020

Table of review/amendment

Revision No.	Date of issue	Detail of review/amendment

2. Objective

To describe the method for collecting nasopharyngeal, throat (oropharyngeal) specimens for SARS-CoV-2, the virus that causes COVID-19.

3. Responsibility

Laboratory staffs who trained on SOP Specimen Collection for COVID-19.

4. Principle

This document will outline the procedures to be followed for the storage and transport of clinical samples to ensure that specimens arrive in the laboratory safely and in condition suitable for testing.

5. Material

- Universal Transport Medium (UTM) or Viral Transport Medium
- Polyesters or Dacron swab
- Tongue depressor
- Zip-log specimen bag
- Ice pack (keep in freezer until ready to package and transport specimen)
- Cooler Box
- Parafilm
- Biological Biohazard Bags (hazardous and non-hazardous)
- Laboratory Reporting Form
- 70% Ethanol (Alcohol)/Hand Sanitizer
- Flashlight (optional)
- Marker/Pen
- Scissor
- A4 Folder
- Sample rack
- Tape
- Personal Protective Equipment (PPE): non-powder gloves, face shield, hair cover, N-95 mask, coverall, apron and shoes cover

6. Reagent

N/A

7. Standard and control

N/A

8. Sample

- Nasopharyngeal Swab
- Oropharyngeal Swab

9. Procedure

- Collector performs hand hygiene
- Collector dons PPE before entering the collection room
  - ✓ Collector dons appropriate PPE according to institution policy
- Collector enters the collection room
- Counsel patient as to the purpose of the sample collection.
- Seat the patient in a comfortable position
- The patient should be away from direct airflow towards the collector
- Stand to one side of the patient to avoid droplets (don't stand directly in front of the patient)
- Ask patient's name
- Label tube of UTM legibly with the patient's name, gender, age, and date of collection
- Tell the patient what you are doing (collecting NP and OP swabs for COVID-19 testing)

8..1 **Nasopharyngeal Swab Collection**

- Ask patient to perform hand hygiene
- Use one swab provided to collect the NP specimen.
- Check for nasal obstructions.
- Tilt the patient's head back 70 degrees and press tip of nose upwards
- Insert the swab into nostril parallel to the palate (not upwards) until resistance is encountered (or the distance is equivalent to that from nostrils to outer opening of patient's ear indicating contact with nasopharynx).
- Rotate swab gently two or three times for several seconds to absorb secretions. Slowly remove the swab while rotating.
- Insert the swab into the tube of UTM, making certain that the swab tip is covered by the liquid in the tube. The swab is to remain in the tube for transport

- Plastic NP swab: The swab stick extends past the top of the tube. Cut with scissors allowing the end with the swab tip to remain in the liquid. The tip of the swab must be immersed in the liquid.

8..2 Oropharyngeal Swab Collection

- Ask patient to open mouth
- Use a tongue depressor to avoid touching the tongue. Using the tongue depressor, press the tongue to explore the gorge. When you cannot use tongue depressors (children), ask the patient to say "AAAHH" sticking out her tongue. Collect secretions on the tonsils, the pillars of the tonsils and the posterior pharyngeal wall.
- Use the second swab provided to collect a specimen by swabbing the patient's posterior pharynx and tonsil area. Rotate the swab 2 to 3 seconds.
- Remove swab slowly carefully avoiding other areas.
- Insert the swab into the same tube of UTM as the NP swab. The swab shaft extends past the top of the tube. Break the swab into the UTM/Cut the swab stick with scissors. The swab tip must be immersed in the liquid.
- Securely tighten the cap on the UTM and use parafilm to seal anymore. Insert tube into rack for transport and place securely in the plastic box.

- Package specimen in triple packaging system (see JD sample collection).
- Use plastic scott tape to secure the outside of the tertiary container.
- Spray 70% ethanol (alcohol) outside of the tertiary container.
- Place the completed Laboratory Reporting Form in A4 envelope and write down sender and receiver information on A4 envelope, then place A4 envelope into the clear filling file folder size A4. Next, place it on the top of tertiary container and secure it with clear plastic tape.
- Spray 70% ethanol (alcohol) outside of the tertiary container again.
- Remove all PPE properly (see point 12 safety precaution).
- When Samples arrived NPHL implement follow by job aid JA-VIR-003

9 **Reporting results**:

N/A

10 **Normal Reference Range**

N/A

11 **References**:

- Novel Coronavirus (2019-nCoV) technical guidance: Laboratory testing for 2019-nCoV in humans: https://www.who.int/emergencies/diseases/novel-coronavirus2019/technical-guidance/laboratory-guidance
- Recommended laboratory tests to identify avian influenza A virus in specimens from humans. World Health Organization, June, 2005. http://www.who.int/csr/disease/avian_influenza/guidelines/avian_labtests2.pdf
- 2019-NOVEL CORONAVIRUS (COVID-19) SPECIMEN COLLECTION KIT INSTRUCTIONS, Rhode Island Department of Health, March 2020, Version 4.
- SOP PPE

12 Safety precaution:

- Always wear full PPE (non-powder gloves, face shield, hair cover, N-95 mask, coverall, apron, safety googles and shoes cover) when handling all specimens and infectious viruses as described as the following:
    - Non-powder gloves
    - Hair Cover
    - N-95 Mask
    - Coverall
    - Shoes Cover (using paper scot tape to seal between the coverall and shoes cover and gloves)
    - Safety googles
    - Apron
    - Face Shield
    - Second layer of non-powder gloves
- Remove all PPE as described as the following:
    - Second layer of non-powder gloves
    - Face Shield
    - Apron
    - Safety goggles
    - Remove paper scot tape that seal between the coverall and shoes cover). Spray 70% ethanol (alcohol). Remove shoes cover
    - Remove paper scot tape that seal between the coverall and gloves
    - Coverall
    - First layer of non-powder gloves
    - N-95 mask

- Hair Cover
- Disinfect hands with 70% ethanol (alcohol)/hand sanitizer

- Place disposable gloves and PPE in a biohazard bag before taking to autoclave.
- Disinfect all work areas after work with 0.1% bleach or 70% alcohol.
- Wash hands thoroughly after removal or personal protective devices used in handling specimens and kit reagents.

13 Supplementary notes

Used Job Aid JA-VIR-001

Used Job Aid JA-VIR-003

Acknowledgement

We are hereby confirming that we already read and understood this SOP. We pledge that we will follow all the regulations and procedures to ensure the good quality of our jobs and the overall goals of the NPHL.

It is our responsibility if there is any incidence caused by the violation of that document(s).

Below are our name and signature:

No	Name of Staff	Initials	Signature	Date
1				
2				
3				
4				
5				
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ANNEX 3: ESF/Safeguards Interim Note: Covid-19 Considerations in Construction/Civil Works Projects

ESF/SAFEGUARDS INTERIM NOTE: COVID-19 CONSIDERATIONS IN CONSTRUCTION/CIVIL WORKS PROJECTS

This note was issued on April 7, 2020 and includes links to the latest guidance as of this date (e.g. from WHO). Given the COVID-19 situation is rapidly evolving, when using this note it is important to check whether any updates to these external resources have been issued.

1. INTRODUCTION

The COVID-19 pandemic presents Governments with unprecedented challenges. Addressing COVID-19 related issues in both existing and new operations starts with recognizing that this is not business as usual and that circumstances require a highly adaptive responsive management design to avoid, minimize and manage what may be a rapidly evolving situation. In many cases, we will ask Borrowers to use reasonable efforts in the circumstances, recognizing that what may be possible today may be different next week (both positively, because more supplies and guidance may be available, and negatively, because the spread of the virus may have accelerated).

This interim note is intended to provide guidance to teams on how to support Borrowers in addressing key issues associated with COVID-19, and consolidates the advice that has already been provided over the past month. As such, it should be used in place of other guidance that has been provided to date. This note will be developed as the global situation and the Bank's learning (and that of others) develops. This is not a time when 'one size fits all'. More than ever, teams will need to work with Borrowers and projects to understand the activities being carried out and the risks that these activities may entail. Support will be needed in designing mitigation measures that are implementable in the context of the project. These measures will need to take into account capacity of the Government agencies, availability of supplies and the practical challenges of operations on-the-ground, including stakeholder engagement, supervision and monitoring. In many circumstances, communication itself may be challenging, where face-to-face meetings are restricted or prohibited, and where IT solutions are limited or unreliable.

This note emphasizes the importance of careful scenario planning, clear procedures and protocols, management systems, effective communication and coordination, and the need for high levels of responsiveness in a changing environment. It recommends assessing the current situation of the project, putting in place mitigation measures to avoid or minimize the chance of infection, and planning what to do if either project workers become infected or the work force includes workers from proximate communities affected by COVID-19. In many projects, measures to avoid or minimize will need to be implemented at the same time as dealing with sick workers and relations with the community, some of whom may also be ill or concerned about infection. Borrowers should understand the obligations that contractors have under their existing contracts (see Section 3), require contractors to put in place appropriate organizational structures (see Section 4) and develop procedures to address different aspects of COVID-19 (see Section 5).

2. CHALLENGES WITH CONSTRUCTION/CIVIL WORKS

Projects involving construction/civil works frequently involve a large work force, together with suppliers and supporting functions and services. The work force may comprise workers from international, national, regional, and local labor markets. They may need to live in on-site accommodation, lodge within communities close to work sites or return to their homes after work. There may be different contractors

permanently present on site, carrying out different activities, each with their own dedicated workers. Supply chains may involve international, regional and national suppliers facilitating the regular flow of goods and services to the project (including supplies essential to the project such as fuel, food, and water). As such there will also be regular flow of parties entering and exiting the site; support services, such as catering, cleaning services, equipment, material and supply deliveries, and specialist sub-contractors, brought in to deliver specific elements of the works.

Given the complexity and the concentrated number of workers, the potential for the spread of infectious disease in projects involving construction is extremely serious, as are the implications of such a spread. Projects may experience large numbers of the work force becoming ill, which will strain the project's health facilities, have implications for local emergency and health services and may jeopardize the progress of the construction work and the schedule of the project. Such impacts will be exacerbated where a work force is large and/or the project is in remote or under-serviced areas. In such circumstances, relationships with the community can be strained or difficult and conflict can arise, particularly if people feel they are being exposed to disease by the project or are having to compete for scarce resources. The project must also exercise appropriate precautions against introducing the infection to local communities.

3. DOES THE CONSTRUCTION CONTRACT COVER THIS SITUATION?

Given the unprecedented nature of the COVID-19 pandemic, it is unlikely that the existing construction/civil works contracts will cover all the things that a prudent contractor will need to do. Nevertheless, the first place for a Borrower to start is with the contract, determining what a contractor's existing obligations are, and how these relate to the current situation.

The obligations on health and safety will depend on what kind of contract exists (between the Borrower and the main contractor; between the main contractors and the sub-contractors). It will differ if the Borrower used the World Bank's standard procurement documents (SPDs) or used national bidding documents. If a FIDIC document has been used, there will be general provisions relating to health and safety. For example, the standard FIDIC, Conditions of Contract for Construction (Second Edition 2017), which contains no 'ESF enhancements', states (in the General Conditions, clause 6.7) that the Contractor will be required:

- to take all necessary precautions to maintain the health and safety of the Contractor's Personnel
- to appoint a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel authorized to enter and or work on the site and to take protective measures to prevent accidents
- to ensure, in collaboration with local health authorities, that medical staff, first aid facilities, sick bay, ambulance services and any other medical services specified are available at all times at the site and at any accommodation
- to ensure suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics

These requirements have been enhanced through the introduction of the ESF into the SPDs (edition dated July 2019). The general FIDIC clause referred to above has been strengthened to reflect the requirements of the ESF. Beyond FIDIC's general requirements discussed above, the Bank's Particular Conditions include a number of relevant requirements on the Contractor, including:

- to provide health and safety training for Contractor's Personnel (which include project workers and all personnel that the Contractor uses on site, including staff and other employees of the Contractor and Subcontractors and any other personnel assisting the Contractor in carrying out project activities)
- to put in place workplace processes for Contractor's Personnel to report work situations that are not safe or healthy
- gives Contractor's Personnel the right to report work situations which they believe are not safe or healthy, and to remove themselves from a work situation which they have a reasonable justification to believe presents an imminent and serious danger to their life or health (with no reprisal for reporting or removing themselves)
- requires measures to be in place to avoid or minimize the spread of diseases including measures to avoid or minimize the transmission of communicable diseases that may be associated with the influx of temporary or permanent contract-related labor
- to provide an easily accessible grievance mechanism to raise workplace concerns

Where the contract form used is FIDIC, the Borrower (as the Employer) will be represented by the Engineer (also referred to in this note as the Supervising Engineer). The Engineer will be authorized to exercise authority specified in or necessarily implied from the construction contract. In such cases, the Engineer (through its staff on site) will be the interface between the PIU and the Contractor. It is important therefore to understand the scope of the Engineer's responsibilities. It is also important to recognize that in the case of infectious diseases such as COVID-19, project management – through the Contractor/subcontractor hierarchy – is only as effective as the weakest link. A thorough review of management procedures/plans as they will be implemented through the entire contractor hierarchy is important. Existing contracts provide the outline of this structure; they form the basis for the Borrower to understand how proposed mitigation measures will be designed and how adaptive management will be implemented, and to start a conversation with the Contractor on measures to address COVID-19 in the project.

4. WHAT PLANNING SHOULD THE BORROWER BE DOING?

Task teams should work with Borrowers (PIUs) to confirm that projects (i) are taking adequate precautions to prevent or minimize an outbreak of COVID-19, and (ii) have identified what to do in the event of an outbreak. Suggestions on how to do this are set out below:

- The PIU, either directly or through the Supervising Engineer, should request details in writing from the main Contractor of the measures being taken to address the risks. As stated in Section 3, the construction contract should include health and safety requirements, and these can be used as the basis for identification of, and requirements to implement, COVID-19 specific measures. The measures may be presented as a contingency plan, as an extension of the existing project emergency and preparedness plan or as standalone procedures. The measures may be reflected in revisions to the project's health and safety manual. This request should be made in writing (following any relevant procedure set out in the contract between the Borrower and the contractor).

- In making the request, it may be helpful for the PIU to specify the areas that should be covered. This should include the items set out in Section 5 below and take into account current and relevant

guidance provided by national authorities, WHO and other organizations. See the list of references in the Annex to this note.

- The PIU should require the Contractor to convene regular meetings with the project health and safety specialists and medical staff (and where appropriate the local health authorities), and to take their advice in designing and implementing the agreed measures.

- Where possible, a senior person should be identified as a focal point to deal with COVID-19 issues. This can be a work supervisor or a health and safety specialist. This person can be responsible for coordinating preparation of the site and making sure that the measures taken are communicated to the workers, those entering the site and the local community. It is also advisable to designate at least one back-up person, in case the focal point becomes ill; that person should be aware of the arrangements that are in place.

- On sites where there are a number of contractors and therefore (in effect) different work forces, the request should emphasize the importance of coordination and communication between the different parties. Where necessary, the PIU should request the main contractor to put in place a protocol for regular meetings of the different contractors, requiring each to appoint a designated staff member (with back up) to attend such meetings. If meetings cannot be held in person, they should be conducted using whatever IT is available. The effectiveness of mitigation measures will depend on the weakest implementation, and therefore it is important that all contractors and sub-contractors understand the risks and the procedure to be followed.

- The PIU, either directly or through the Supervising Engineer, may provide support to projects in identifying appropriate mitigation measures, particularly where these will involve interface with local services, in particular health and emergency services. In many cases, the PIU can play a valuable role in connecting project representatives with local Government agencies, and helping coordinate a strategic response, which takes into account the availability of resources. To be most effective, projects should consult and coordinate with relevant Government agencies and other projects in the vicinity.

- Workers should be encouraged to use the existing project grievance mechanism to report concerns relating to COVID-19, preparations being made by the project to address COVID-19 related issues, how procedures are being implemented, and concerns about the health of their co-workers and other staff.

5. WHAT SHOULD THE CONTRACTOR COVER?

The Contractor should identify measures to address the COVID-19 situation. What will be possible will depend on the context of the project: the location, existing project resources, availability of supplies, capacity of local emergency/health services, the extent to which the virus already exist in the area. A systematic approach to planning, recognizing the challenges associated with rapidly changing circumstances, will help the project put in place the best measures possible to address the situation. As discussed above, measures to address COVID-19 may be presented in different ways (as a contingency plan, as an extension of the existing project emergency and preparedness plan or as standalone procedures). PIUs and contractors should refer to guidance issued by relevant authorities, both national

and international (e.g. WHO), which is regularly updated (see sample References and links provided in the Annex).

Addressing COVID-19 at a project site goes beyond occupational health and safety, and is a broader project issue which will require the involvement of different members of a project management team. In many cases, the most effective approach will be to establish procedures to address the issues, and then to ensure that these procedures are implemented systematically. Where appropriate given the project context, a designated team should be established to address COVID-19 issues, including PIU representatives, the Supervising Engineer, management (e.g. the project manager) of the contractor and sub-contractors, security, and medical and OHS professionals. Procedures should be clear and straightforward, improved as necessary, and supervised and monitored by the COVID-19 focal point(s). Procedures should be documented, distributed to all contractors, and discussed at regular meetings to facilitate adaptive management. The issues set out below include a number that represent expected good workplace management but are especially pertinent in preparing the project response to COVID-19.

(a) ASSESSING WORKFORCE CHARACTERISTICS

Many construction sites will have a mix of workers e.g. workers from the local communities; workers from a different part of the country; workers from another country. Workers will be employed under different terms and conditions and be accommodated in different ways. Assessing these different aspects of the workforce will help in identifying appropriate mitigation measures:

- The Contractor should prepare a detailed profile of the project work force, key work activities, schedule for carrying out such activities, different durations of contract and rotations (e.g. 4 weeks on, 4 weeks off).
- This should include a breakdown of workers who reside at home (i.e. workers from the community), workers who lodge within the local community and workers in on-site accommodation. Where possible, it should also identify workers that may be more at risk from COVID-19, those with underlying health issues or who may be otherwise at risk.
- Consideration should be given to ways in which to minimize movement in and out of site. This could include lengthening the term of existing contracts, to avoid workers returning home to affected areas, or returning to site from affected areas.
- Workers accommodated on site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided.
- Consideration should be given to requiring workers lodging in the local community to move to site accommodation (subject to availability) where they would be subject to the same restrictions.
- Workers from local communities, who return home daily, weekly or monthly, will be more difficult to manage. They should be subject to health checks at entry to the site (as set out above) and at some point, circumstances may make it necessary to require them to either use accommodation on site or not to come to work.

(b) ENTRY/EXIT TO THE WORK SITE AND CHECKS ON COMMENCEMENT OF WORK

Entry/exit to the work site should be controlled and documented for both workers and other parties, including support staff and suppliers. Possible measures may include:

- Establishing a system for controlling entry/exit to the site, securing the boundaries of the site, and establishing designating entry/exit points (if they do not already exist). Entry/exit to the site should be documented.
- Training security staff on the (enhanced) system that has been put in place for securing the site and controlling entry and exit, the behaviors required of them in enforcing such system and any COVID - 19 specific considerations.
- Training staff who will be monitoring entry to the site, providing them with the resources they need to document entry of workers, conducting temperature checks and recording details of any worker that is denied entry.
- Confirming that workers are fit for work before they enter the site or start work. While procedures should already be in place for this, special attention should be paid to workers with underlying health issues or who may be otherwise at risk. Consideration should be given to demobilization of staff with underlying health issues.
- Checking and recording temperatures of workers and other people entering the site or requiring self-reporting prior to or on entering the site.
- Providing daily briefings to workers prior to commencing work, focusing on COVID-19 specific considerations including cough etiquette, hand hygiene and distancing measures, using demonstrations and participatory methods.
- During the daily briefings, reminding workers to self-monitor for possible symptoms (fever, cough) and to report to their supervisor or the COVID-19 focal point if they have symptoms or are feeling unwell.
- Preventing a worker from an affected area or who has been in contact with an infected person from returning to the site for 14 days or (if that is not possible) isolating such worker for 14 days.
- Preventing a sick worker from entering the site, referring them to local health facilities if necessary or requiring them to isolate at home for 14 days.

(c) GENERAL HYGIENE

Requirements on general hygiene should be communicated and monitored, to include:

- Training workers and staff on site on the signs and symptoms of COVID-19, how it is spread, how to protect themselves (including regular handwashing and social distancing) and what to do if they or other people have symptoms (for further information see WHO COVID-19 advice for the public).
- Placing posters and signs around the site, with images and text in local languages.
- Ensuring handwashing facilities supplied with soap, disposable paper towels and closed waste bins exist at key places throughout site, including at entrances/exits to work areas; where there is a toilet, canteen or food distribution, or provision of drinking water; in worker accommodation; at waste stations; at stores; and in common spaces. Where handwashing facilities do not exist or are not adequate, arrangements should be made to set them up. Alcohol based sanitizer (if available, 60-95% alcohol) can also be used.
- Review worker accommodations, and assess them in light of the requirements set out in IFC/EBRD guidance on Workers' Accommodation: processes and standards, which provides valuable guidance as to good practice for accommodation.
- Setting aside part of worker accommodation for precautionary self-quarantine as well as more formal isolation of staff who may be infected (see paragraph (f)).

(d) CLEANING AND WASTE DISPOSAL

Conduct regular and thorough cleaning of all site facilities, including offices, accommodation, canteens, common spaces. Review cleaning protocols for key construction equipment (particularly if it is being operated by different workers). This should include:

- Providing cleaning staff with adequate cleaning equipment, materials and disinfectant.
- Review general cleaning systems, training cleaning staff on appropriate cleaning procedures and appropriate frequency in high use or high-risk areas.
- Where it is anticipated that cleaners will be required to clean areas that have been or are suspected to have been contaminated with COVID-19, providing them with appropriate PPE: gowns or aprons, gloves, eye protection (masks, goggles or face screens) and boots or closed work shoes. If appropriate PPE is not available, cleaners should be provided with best available alternatives.
- Training cleaners in proper hygiene (including handwashing) prior to, during and after conducting cleaning activities; how to safely use PPE (where required); in waste control (including for used PPE and cleaning materials).
- Any medical waste produced during the care of ill workers should be collected safely in designated containers or bags and treated and disposed of following relevant requirements (e.g., national, WHO). If open burning and incineration of medical wastes is necessary, this should be for as limited a duration as possible. Waste should be reduced and segregated, so that only the smallest amount of waste is incinerated (for further information see WHO interim guidance on water, sanitation and waste management for COVID-19).

(e) ADJUSTING WORK PRACTICES

Consider changes to work processes and timings to reduce or minimize contact between workers, recognizing that this is likely to impact the project schedule. Such measures could include:

- Decreasing the size of work teams.
- Limiting the number of workers on site at any one time.
- Changing to a 24-hour work rotation.
- Adapting or redesigning work processes for specific work activities and tasks to enable social distancing, and training workers on these processes.
- Continuing with the usual safety trainings, adding COVID-19 specific considerations. Training should include proper use of normal PPE. While as of the date of this note, general advice is that construction workers do not require COVID-19 specific PPE, this should be kept under review (for further information see WHO interim guidance on rational use of personal protective equipment (PPE) for COVID-19).
- Reviewing work methods to reduce use of construction PPE, in case supplies become scarce or the PPE is needed for medical workers or cleaners. This could include, e.g. trying to reduce the need for dust masks by checking that water sprinkling systems are in good working order and are maintained or reducing the speed limit for haul trucks.
- Arranging (where possible) for work breaks to be taken in outdoor areas within the site.
- Consider changing canteen layouts and phasing meal times to allow for social distancing and phasing access to and/or temporarily restricting access to leisure facilities that may exist on site, including gyms.

- At some point, it may be necessary to review the overall project schedule, to assess the extent to which it needs to be adjusted (or work stopped completely) to reflect prudent work practices, potential exposure of both workers and the community and availability of supplies, taking into account Government advice and instructions.

(f) PROJECT MEDICAL SERVICES

Consider whether existing project medical services are adequate, taking into account existing infrastructure (size of clinic/medical post, number of beds, isolation facilities), medical staff, equipment and supplies, procedures and training. Where these are not adequate, consider upgrading services where possible, including:

- Expanding medical infrastructure and preparing areas where patients can be isolated. Guidance on setting up isolation facilities is set out in WHO interim guidance on considerations for quarantine of individuals in the context of containment for COVID-19). Isolation facilities should be located away from worker accommodation and ongoing work activities. Where possible, workers should be provided with a single well-ventilated room (open windows and door). Where this is not possible, isolation facilities should allow at least 1 meter between workers in the same room, separating workers with curtains, if possible. Sick workers should limit their movements, avoiding common areas and facilities and not be allowed visitors until they have been clear of symptoms for 14 days. If they need to use common areas and facilities (e.g. kitchens or canteens), they should only do so when unaffected workers are not present and the area/facilities should be cleaned prior to and after such use.
- Training medical staff, which should include current WHO advice on COVID-19 and recommendations on the specifics of COVID-19. Where COVID-19 infection is suspected, medical providers on site should follow WHO interim guidance on infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected.
- Training medical staff in testing, if testing is available.
- Assessing the current stock of equipment, supplies and medicines on site, and obtaining additional stock, where required and possible. This could include medical PPE, such as gowns, aprons, medical masks, gloves, and eye protection. Refer to WHO guidance as to what is advised (for further information see WHO interim guidance on rational use of personal protective equipment (PPE) for COVID-19).
- If PPE items are unavailable due to world-wide shortages, medical staff on the project should agree on alternatives and try to procure them. Alternatives that may commonly be found on constructions sites include dust masks, construction gloves and eye goggles. While these items are not recommended, they should be used as a last resort if no medical PPE is available.
- Ventilators will not normally be available on work sites, and in any event, intubation should only be conducted by experienced medical staff. If a worker is extremely ill and unable to breathe properly on his or her own, they should be referred immediately to the local hospital (see (g) below).
- Review existing methods for dealing with medical waste, including systems for storage and disposal (for further information see WHO interim guidance on water, sanitation and waste management for COVID-19, and WHO guidance on safe management of wastes from health-care activities).

(g) LOCAL MEDICAL AND OTHER SERVICES

Given the limited scope of project medical services, the project may need to refer sick workers to local medical services. Preparation for this includes:

- Obtaining information as to the resources and capacity of local medical services (e.g. number of beds, availability of trained staff and essential supplies).
- Conducting preliminary discussions with specific medical facilities, to agree what should be done in the event of ill workers needing to be referred.
- Considering ways in which the project may be able to support local medical services in preparing for members of the community becoming ill, recognizing that the elderly or those with pre-existing medical conditions require additional support to access appropriate treatment if they become ill.
- Clarifying the way in which an ill worker will be transported to the medical facility, and checking availability of such transportation.
- Establishing an agreed protocol for communications with local emergency/medical services.
- Agreeing with the local medical services/specific medical facilities the scope of services to be provided, the procedure for in-take of patients and (where relevant) any costs or payments that may be involved.
- A procedure should also be prepared so that project management knows what to do in the unfortunate event that a worker ill with COVID-19 dies. While normal project procedures will continue to apply, COVID-19 may raise other issues because of the infectious nature of the disease. The project should liaise with the relevant local authorities to coordinate what should be done, including any reporting or other requirements under national law.

(h) INSTANCES OR SPREAD OF THE VIRUS

WHO provides detailed advice on what should be done to treat a person who becomes sick or displays symptoms that could be associated with the COVID-19 virus (for further information see WHO interim guidance on infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected). The project should set out risk-based procedures to be followed, with differentiated approaches based on case severity (mild, moderate, severe, critical) and risk factors (such as age, hypertension, diabetes) (for further information see WHO interim guidance on operational considerations for case management of COVID-19 in health facility and community). These may include the following:

- If a worker has symptoms of COVID-19 (e.g. fever, dry cough, fatigue) the worker should be removed immediately from work activities and isolated on site.
- If testing is available on site, the worker should be tested on site. If a test is not available at site, the worker should be transported to the local health facilities to be tested (if testing is available).
- If the test is positive for COVID-19 or no testing is available, the worker should continue to be isolated. This will either be at the work site or at home. If at home, the worker should be transported to their home in transportation provided by the project.
- Extensive cleaning procedures with high-alcohol content disinfectant should be undertaken in the area where the worker was present, prior to any further work being undertaken in that area. Tools used by the worker should be cleaned using disinfectant and PPE disposed of.
- Co-workers (i.e. workers with whom the sick worker was in close contact) should be required to stop work, and be required to quarantine themselves for 14 days, even if they have no symptoms.

- Family and other close contacts of the worker should be required to quarantine themselves for 14 days, even if they have no symptoms.
- If a case of COVID-19 is confirmed in a worker on the site, visitors should be restricted from entering the site and worker groups should be isolated from each other as much as possible.
- If workers live at home and has a family member who has a confirmed or suspected case of COVID-19, the worker should quarantine themselves and not be allowed on the project site for 14 days, even if they have no symptoms.
- Workers should continue to be paid throughout periods of illness, isolation or quarantine, or if they are required to stop work, in accordance with national law.
- Medical care (whether on site or in a local hospital or clinic) required by a worker should be paid for by the employer.

(i) CONTINUITY OF SUPPLIES AND PROJECT ACTIVITIES

Where COVID-19 occurs, either in the project site or the community, access to the project site may be restricted, and movement of supplies may be affected.

- Identify back-up individuals, in case key people within the project management team (PIU, Supervising Engineer, Contractor, sub-contractors) become ill, and communicate who these are so that people are aware of the arrangements that have been put in place.
- Document procedures, so that people know what they are, and are not reliant on one person's knowledge.
- Understand the supply chain for necessary supplies of energy, water, food, medical supplies and cleaning equipment, consider how it could be impacted, and what alternatives are available. Early pro-active review of international, regional and national supply chains, especially for those supplies that are critical for the project, is important (e.g. fuel, food, medical, cleaning and other essential supplies). Planning for a 1-2 month interruption of critical goods may be appropriate for projects in more remote areas.
- Place orders for/procure critical supplies. If not available, consider alternatives (where feasible).
- Consider existing security arrangements, and whether these will be adequate in the event of interruption to normal project operations.
- Consider at what point it may become necessary for the project to significantly reduce activities or to stop work completely, and what should be done to prepare for this, and to re-start work when it becomes possible or feasible.

(j) TRAINING AND COMMUNICATION WITH WORKERS

Workers need to be provided with regular opportunities to understand their situation, and how they can best protect themselves, their families and the community. They should be made aware of the procedures that have been put in place by the project, and their own responsibilities in implementing them.

- It is important to be aware that in communities close to the site and amongst workers without access to project management, social media is likely to be a major source of information. This raises the importance of regular information and engagement with workers (e.g. through training, town halls, tool boxes) that emphasizes what management is doing to deal with the risks of COVID-19. Allaying fear is an important aspect of work force peace of mind and business continuity. Workers should be given an opportunity to ask questions, express their concerns, and make suggestions.

- Training of workers should be conducted regularly, as discussed in the sections above, providing workers with a clear understanding of how they are expected to behave and carry out their work duties.
- Training should address issues of discrimination or prejudice if a worker becomes ill and provide an understanding of the trajectory of the virus, where workers return to work.
- Training should cover all issues that would normally be required on the work site, including use of safety procedures, use of construction PPE, occupational health and safety issues, and code of conduct, taking into account that work practices may have been adjusted.
- Communications should be clear, based on fact and designed to be easily understood by workers, for example by displaying posters on handwashing and social distancing, and what to do if a worker displays symptoms.

(k) COMMUNICATION AND CONTACT WITH THE COMMUNITY

Relations with the community should be carefully managed, with a focus on measures that are being implemented to safeguard both workers and the community. The community may be concerned about the presence of non-local workers, or the risks posed to the community by local workers presence on the project site. The project should set out risk-based procedures to be followed , which may reflect WHO guidance (for further information see WHO Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response). The following good practice should be considered:

- Communications should be clear, regular, based on fact and designed to be easily understood by community members.
- Communications should utilize available means. In most cases, face-to-face meetings with the community or community representatives will not be possible. Other forms of communication should be used; posters, pamphlets, radio, text message, electronic meetings. The means used should take into account the ability of different members of the community to access them, to make sure that communication reaches these groups.
- The community should be made aware of procedures put in place at site to address issues related to COVID-19. This should include all measures being implemented to limit or prohibit contact between workers and the community. These need to be communicated clearly, as some measures will have financial implications for the community (e.g. if workers are paying for lodging or using local facilities). The community should be made aware of the procedure for entry/exit to the site, the training being given to workers and the procedure that will be followed by the project if a worker becomes sick.
- If project representatives, contractors or workers are interacting with the community, they should practice social distancing and follow other COVID-19 guidance issued by relevant authorities, both national and international (e.g. WHO).

6. EMERGENCY POWERS AND LEGISLATION

Many Borrowers are enacting emergency legislation. The scope of such legislation, and the way it interacts with other legal requirements, will vary from country to country. Such legislation can cover a range of issues, for example:

- Declaring a public health emergency

- Authorizing the use of police or military in certain activities (e.g. enforcing curfews or restrictions on movement)
- Ordering certain categories of employees to work longer hours, not to take holiday or not to leave their job (e.g. health workers)
- Ordering non-essential workers to stay at home, for reduced pay or compulsory holiday

Except in exceptional circumstances (after referral to the World Bank's Operations Environmental and Social Review Committee (OESRC)), projects will need to follow emergency legislation to the extent that these are mandatory or advisable. It is important that the Borrower understands how mandatory requirements of the legislation will impact the project. Teams should require Borrowers (and in turn, Borrowers should request Contractors) to consider how the emergency legislation will impact the obligations of the Borrower set out in the legal agreement and the obligations set out in the construction contracts. Where the legislation requires a material departure from existing contractual obligations, this should be documented, setting out the relevant provisions.

ANNEX 4: SPECIFIC MEASURES FOR COVID-19 INFECTION PREVENTION AND CONTROL

This provides a brief on standard operation procedure for COVID-19 related service of health facility. This SOP provides specific prevention and precaution measures for health staff, workers, and drivers for safe performances during working with COVID-19 cases at house of patients, at communities, during transport, and at the health facilities.

3.4.1 Prevention and precaution measures against the spread of COVID-19 Virus

- In the community: Effective preventive measures include: avoiding contact with the face, including eyes, nose and mouth, respiratory hygiene (eg, coughing, sneezing, using elbows) in a separate room if not feeling well. Wear a surgical mask if there is a respiratory symptom and keep a minimum distance of 1 meter from each other and practice disinfecting the area normally exposed.
- At the health facility: Effective preventive measures include: early identification of suspects and screening of sources of infection through triage and screening of suspected patients. Implement standard precautions and additional precautions for isolation for suspected cases and cases of COVID-19 (laboratory certified). The proper use of personal protective equipment (PPE) by health care workers and patients. Properly practice on cleaning and waste management. In addition, health staff and workers who are unwell or have respiratory symptoms should not come to work.

3.4.2 Use of personal protective equipment

The following guidelines set out the minimum standards for proper personal precaution based on WHO recommendations. Risk assessments should be made in advance, including the risk of side effects and the extent of exposure to blood, body fluids, airborne droplets, or skin abrasions prior to performing each maintenance activity to ensure staff safety and increase the effectiveness of personal protective equipment use. For a summary of the proper use of personal protective equipment depending on staff duties, staff locations, and types of activities.

This SOP also provide detail PPEs need to use at health facility, during transportation, and at community and at home.

a. Healthcare facilities: hospital and health center

Healthcare Workers	• The initial reception and distribution and screening, if not related to direct contact with the patient, do not require the use of personal protective equipment, but should be kept at least 1 meter distance. When distancing practice is not possible, wear a surgical mask, goggles or face shield.

	• Medical evaluation, classification, second screening in the ward, with patients with respiratory symptoms need to wear surgical masks, goggles, eye protection or face shield and gowns. • Direct care of suspected patients and laboratory-certified COVID-19 patients should wear gloves, surgical mask, goggles or face shield and gown. For any activity that could cause the release of small particles through the air (some emergency activities, such as the use of respirators), wear an N95 mask and a waterproof jacket/vest. • Collect respiratory samples for the lab: wear gloves, surgical masks, goggles, or face shield and gown. For the collection of respiratory samples by any procedure that may generate small particles through the air, an additional N95 mask and jacket/vest must be worn.
Cleaners	When cleaning outpatient room and inpatient rooms, wear thick gloves, surgical masks, goggles, or face shield, gown, boots, or closed-toe shoes.
Other staff (security administration)	Other staff (Security Administration) Administrative and security work that does not involve direct contact with the patient is not required to wear personal protective equipment, but must maintain a distance of at least 1 meter.
Patients	All patients entering the treatment and healthcare facilities have respiratory symptoms must wear a surgical mask.

b. Transportation: Ambulance and patient vehicles

Healthcare workers	Transporting suspected patients or COVID-19 patients to a health facility must wear a surgical mask, goggles or face shield, and a gown.
Driver	• When driving to send a suspected patient or a COVID-19 patient from one health facility to another, it is not required to wear personal protective equipment if the driver's seat is isolated from the patient's but must be carefully separated. Less than 1 meter. • Wear a surgical mask when driving and if the driving area is not separated from the suspect or COVID-19 patient. • When lifting a suspected or a COVID-19 patient, must wear gloves, a surgical mask, goggles, face shield, and a gown.
Cleaner	• When cleaning the transit patient vehicle should wear thick gloves, a surgical mask, goggles or face shield, a gown, boots or closed-toe shoes.
Patient	• All patients with respiratory symptoms should wear a surgical mask.

c. At community and at home

Emergency Response Team	• Face-to-face interviews with suspected or COVID-19 patients must be performed with a surgical mask and keep at least 1 meter apart. Interviews are conducted outside the house. Suspects or COVID-19 patients must wear a surgical mask. • Interview with a person who has been exposed to COVID-19 patient and has no symptom, does not require the use of personal protective equipment, and must be kept at least 1 meter apart. • To collect the respiratory samples for the laboratory, wear gloves, goggles or face shield and a gown.
Healthcare workers	Direct contact with suspected and COVID-19 patients: wear gloves, surgical masks, goggles or face shield and gown.
Patient caregiver	• To care for suspected and confirmed patients with COVID-19 or to wash feces, urine or waste of COVID-19 patients must wear gloves, a mask, goggles or face shield and jacket/vest if expose to scattering. • When entering the suspected or confirmed COVID-19 patient but not to provide direct care should wear a surgical mask.
Patient	• All patients with respiratory symptoms must wear a surgical mask and practice at least 1 meter distance from each other.

d. At the laboratory

Laboratory technician	• Molecular diagnostics (preparation for TRT-PCR) must be performed with gloves, hair cover, coverall, goggles or face shield, and shoes cover. The risk assessment may indicate the need for respiratory protection (for example, wearing a N95 mask). • Laboratory staff must follow standard procedures and be properly trained in Level 2 and 3 (P2 / P3). • Watch the video on how to use personal protective equipment in the biological safety laboratory level 2 https://bit.ly/2OqA5Be and level 3 https://bit.ly/3h9H91D of the National Institute of Public Health.

Put on and take off PPE should strictly follow the following procedures

a. Procedure for PPE put on

1. Pre-assess the risks, including exposure to blood, body fluids, airborne droplets, or skin abrasions before performing any care activity. Choose personal protective equipment based on the results of this assessment.
2. Wash your hands with soap and water (40-60 seconds) or alcohol (20-30 seconds) before wearing personal protective equipment.
3. Wear a tube jacket
4. Wear a surgical mask, beware of infections through contact with small cuts.
5. Wear a N95 mask for any activity that creates small airborne particles
6. Wear goggles or face shield
7. Wear gloves and ensure that gloves are worn over the gown.

b. Procedure for PPE take off

1. Take off gloves and wash hands
2. Take off the gown, be sure to remove it carefully so that other objects do not come out of the gown and wash hand
3. Remove goggles or face shield and wash hand
4. Remove the mask
5. Wash your hands with soap and water (40-60 seconds) or alcohol (20-30 seconds) again.

Additional notes

- Wear personal protective equipment fit you to ensure that your mask and goggles do not slip.
- Do not touch your face while wearing personal protective equipment.
- Do not wear a mask if it is damaged, damp, or you have touched it with unclean hands.
- Do not reuse disposed personal protective equipment.
- Clean and disinfect any reusable personal protective equipment.
- There is no reliable evidence of spraying disinfectants on personal protective equipment after use.

3.4.3 Precaution in isolation

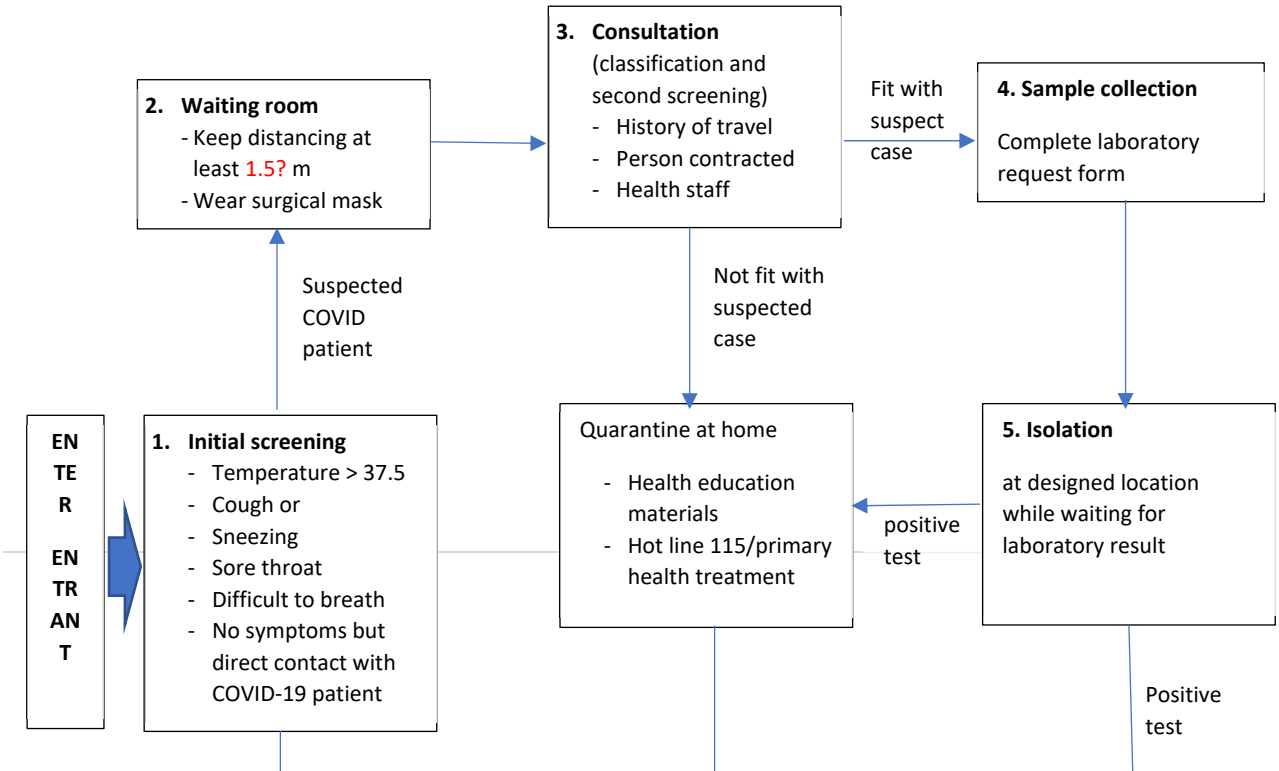
Precaution is advised as follows

Suspected/confirm cases of Covid-19	Standard precaution + Contact + Droplets
Suspected/confirm cases of Covid-19 during aerosol generating procedure1	Precaution Standard + Contact + Airborne + Eye protection

- Suspects or confirm COVID-19 patients should be placed in a separate, well-ventilated room, if possible.
- When there is no separate room for each individual COVID-19 patients may be placed in a shared room.
- Do not place suspected cases of COVID-19 and confirm COVID-19 (laboratory-certified) in a shared room.
- Arrange the beds at least 1 meter distance.
- Where possible, assign care staff for only COVID-19 patient to reduce the risk of infection.
- Use disposable or reserve devices for the COVID-19 only (for example, thermometers, blood pressure monitors, stereoscopes).
- If necessary, use one patient after another, wash and disinfect with 70% ethyl alcohol before using for the next patient.
- Use portable X-ray equipment and other important diagnostic tools intended only for COVID 19 patients. If it is required to transfer the patient should use a predetermined route and the patient wear a surgical mask.
- Activities that generate aerosol generating procedures should be performed in a well-ventilated room with natural ventilation at least 150 liters per second for one person. The number of people in a room should be limited to the minimum number needed for medical care.

3.3.4 Patient flow

Figure below presents flow of patients in health facility. Flow of patient contain of six steps, from initial health screening when entering health facility to hospitalization if patient is confirmed a COVID-19 patient.



a. Initial health screening

- Initial screening for suspects must be conducted at the entrance of the health facility and must be done separately from the outpatient department.
- The purpose of the initial screening is to prevent possible cases of COVID-19 from spreading to other routine services, such as outpatient, obstetric and surgical services, etc.
- All individual who enters the health facility are screened by measuring the temperature using the Infrared Thermometer and asking the following questions:
  i. Fever at least 37.5 degrees Celsius or
  ii. Cough or
  iii. Runny nose or
  iv. Sore throat or
  v. Difficulty breathing
  vi. You have no symptoms but have contacted COVID-19 patient.

(According to the definition of suspected cases of COVID-19 disease of the Ministry of Health dated May 1, 2020)

- If any of the above signs are present, the person is considered a COVID-19 suspect and is given a surgical mask and sent to a waiting area for COVID-19 suspect for further evaluation by an medical expert team. Keep at least 1.5 meter away from suspected patients.
- If none of the above symptoms are present, the person may be referred to an outpatient or hospital clinic.

b. Consultation/diagnostic

The diagnostic steps include: acceptation and classification of the disease with clear assessment (acuity-based triage) and screening to find the second suspect.

Acceptance and classification of diseases with a clear assessment	• is a standardized method of classifying patients in a health facility. • Used to identify patients who need immediate medical attention and who can safely wait or who may be referred to a more competent health facility according to their medical condition. • Patients with severe symptoms should be referred to the intensive care unit immediately and a respiratory sample

	taken for laboratory testing and a suspected disease until the results are confirmed by the laboratory.
Medical examination to find second suspect case	• For patients with mild to moderate symptoms, screening for the second suspect should be done by asking the following questions: - Travel from one province to another or outside of Cambodia in the last 14 days - Contact on someone who has traveled abroad in Cambodia for the last 14 days - Exposure to laboratory-certified COVID-19 patients in the last 14 days - Health staff • If any of the above symptoms are present, collect samples for laboratory testing and place the patient in a designated place during the waiting period. • If none of the above symptoms are present, the patient may be allowed to return home to isolate himself or herself. These are based on medical evaluation.

c. Hospitalization

- If the patient has a positive test, he or she is considered as a case of laboratory-certified COVID-19 and he or she is put in a shared room with other laboratory-certified COVID-19 patients. Provide information to the Department of Disease Control and Prevention of the Ministry of Health immediately.
- If the patient has a negative test, he or she is considered non-COVID-19 and can return home to isolate himself or herself with providing support health education.

3.4.5 Management and risk assessment of health workers

- Health care personnel who provide direct care to suspected or COVID-19 patients should monitor their own symptoms (eg, fever, cough, runny nose, and shortness of breath) and assess the risks if they expose to virus.
- Health facilities may use the World Health Organization's COVID-19 Assessment Tool to assess risk levels of healthcare workers.

If healthcare workers are considered high risk:

Activities performed by health workers	Activities that healthcare facilities need to do
• Stop contact with patients within 14 days of contact with COVID-19. • Quarantine for 14 days of meditation in a designated place • Test for COVID-19	• Provide re-training on prevention and control of contagion for health workers, including standards precautions, isolation and proper use of personal protective equipment. • Provide social psychosocial support to a health worker during anesthesia or during an illness if he or she becomes a COVID-19 patient. • Provide payment to the health worker for a period of quarantine or illness (if not included in the monthly salary) or renew the contract for the duration of quarantine or illness.

If healthcare workers are considered low risk:

Activities that healthcare workers should do	Activities that healthcare facilities need to do
• Record for 14 days from the last exposure with COVID-19: your temperature and if you have a cough, runny nose or shortness of breath. • Contact a health facility if you have any of the symptoms that could be attributed to COVID-19.	• Strengthen standard precautions and precautions on isolation and proper use of personal protective equipment for all staff in health facilities.

3.4.6 Cleaning practices

- Wash the material with detergent and water just to remove impurities (e.g dust, blood, saliva, mucus, mucus, tears, etc.), but it does not kill the virus that causes COVID-19.
- Disinfectants are needed to remove the virus that causes COVID-19 disease.
- Disinfectants that are effective against COVID-19 include:

70% ethyl alcohol	To disinfect contaminate small objects before and after use, such as reusable materials (e.g thermoscopes)
Sodium hypochlorite (bleach) at 0.5%	To disinfect on blood and fluid stain areas
Sodium hypochlorite at 0.1%	To disinfect surface and medical equipment
Chlorine at 0.5%	To disinfect the floor tile
Chlorine at 0.05%	To disinfect goggles, face masks or safety goggles (first clean with detergent and water, then soak in chlorine at 0.05%

- Wear a face mask, goggles, gown and thick gloves when mixing chlorine, as chlorine can cause respiratory and skin irritation.
- Clean the room at least once a day. The final cleaning must be done when the patient leaves the hospital.
- Frequent cleaning of exposed areas, such as door handles and chairs
- The principle of cleaning and disinfection applies to all patient care units
- Always be sure to clean patient care equipment after each use
- Provide adequate cleaning supplies in high-risk areas (for example, in isolation rooms, maternity room, and operating rooms).
- A separate supply of room cleaning supplies should be kept for use only in that room.
- Clean from the cleanest area to the dirtiest area.
- Clean from high to low and from outside to inside.
- Clean isolation room last
- Use a damp cloth to remove dust
- Use 3 bins system for cleaning and disinfection as follows:
    1. Cleansing (water and soap or detergent)
    2. Rinse using only water
    3. Disinfect using (Sodium hypochlorite at 0.5% or chlorine 0.5%)
- Water for washing must be clean water
- Some countries, such as China, Thailand and Vietnam, do not use disinfectants in the air in public areas. However, there is evidence that the use of airborne microbial sprays is effective. The virus that causes COVID-19 is transmitted from person to person through droplets from the respiratory and contact with infected people or infected surfaces. Airborne transmission is possible under certain circumstances, such as those that create aerosol generating procedures.

a. Cleaning ambulance and patient vehicles

- After transporting the patient, leave the vehicle open for 15 to 20 minutes for adequate ventilation before returning.
- The time to transfer the patient and complete the paperwork should be sufficient time to change the air in the vehicle.
- Use standard precautions of hospital, wash the vehicle first, then disinfect later.
- Doors should be open when washing vehicles.

b. Cleaning of soiled linen/bed cover, pillow, staff uniforms, and patient clothes

- Dirty soiled linen/bed cover should be placed in a bag or container with a clear indicated label.
- Should use washing machine with hot water at 60-90 degrees Celsius and detergent should be used. The laundry can be dried according to the usual procedures.
- If dirty with patient feces or urine on the surface (such as soiled linen or floor), use a paper towel to collect the stool or urine and place in the toilet immediately. If the place is for single use, we have to treat as an infectious waste. If the towel is reusable, we have to treat it as a stained towel. Next, clean and disinfect the stained area (with chlorine0.5%).

3.4.7 Medical waste management

- All medical waste contained during the care of COVID-19 patients must comply with standard operating procedures for standard disposal of TB and HIV (for example, collection in waste bins or bags). Infected, treated, disinfected or incinerated daily in incinerators (if possible, otherwise disinfected with an autoclave before being sent to a hospital with incinerator).
- If waste is to be removed from a health facility, it is important to understand where and how this waste will be treated, disinfected and disposed of.

ANNEX 5: LABOUR MANAGEMENT PROCUDURES

for

BSL2+ and BSL3 Laboratories Establishment at the NIPH

Labor Management Procedure (LMP) is developed for management of labors needed, risks of labor used, and measures to manage risks for this established BSL3 laboratory at NIPH. It provides overview on labor use on subproject, relevant national labor legislation, types and number of workers need, time of labor requirements, labor training schedule, assessment of key potential labor risks and actions to management labor risk in each stage of construction, and workers' grievance communication, and templates on Code of Conduct for Contractors and Workers.

Since this established BSL3 works will mainly involve stages of construction of building, installment of laboratory equipment, and operation of laboratory, thus this LMP applies management of labors use during these stages respectively

LABOR USE IN BSL3 ESTABLISHMENT

There are three types of workers involved this establishment and operation of BSL3 laboratory

- **Direct workers:** there are two types of direct workers
    - Contractor for construction of BSL3 building. The contractor will be contracted directly with NIPH/MoH for building construction works; and
    - Supplier/installer of BSL3 equipment and machines
- **Contracted workers:** there are two types of contracted workers
    - Construction workers employed by contractor to perform construction work; and
- Installation workers employed by installer; and **Civil servant –** laboratory staff and contract staff and workers who employed and work at the NIPH for operating the laboratories

This BSL3 laboratory establishment and operation will engage a variety of staff and workers as listed as in Table 1 below.

Table 1: List of workers and time required for establishment of BSL3 at NIPH

Stages of subproject	**Estimated Number of Workers**	**Characteristics of Workers**	**Timing of Labor Requirements**	**Direct workers of contract**
Construction of building	xx??	• x Contractor • x civil engineer supervisor • x safety officer • x skill workers • xx non-skill workers	During preparation of construction work During construction work During clean up	Construction building contractor
Installment of BSL3	xx??	1 Installer x skill workers x non-skill workers	After construction of building	Contract Supplier/installer

Operation of BSL3	xx??	XX Laboratory staff XX Lab operators XX contract workers (cleaners and waste collectors)	During operation of the laboratory	Director of NIPH

A REVIEW OF NATIOAL LABOR LEGISLATION

Cambodia has national legislation that outlines worker's rights. The Labor Law (1997) remains the key document governing the regulatory framework for labor in Cambodia. This Labor law defines non-discrimination in employment and in wages. It establishes a minimum wage level, which may vary among regions. Working hours are limited to 8 hours per day, 6 days a week. There are strong regulatory provisions against discrimination in the work place, enhancing from a legal point of view fair treatment, non-discrimination and equal opportunity, special protection and assistance to vulnerable workers. This labor Law also dedicated to health and safety in the workplace. The law also covers those who work for subcontractors. Furthermore, Cambodia has ratified all relevant ILO conventions, such as those on forced labor, freedom of association, right to organize and collective bargaining, equal remuneration, minimum age, discrimination and child labor.

Child labor remains a noticeable gap in the legal framework despite many years of participation in related international programs. The Labor Law defines 12 years old as the minimum working age for children, though 12-15 years old are meant to only engage in certain light jobs, but this is not always closely monitored. The Prakas on the Prohibition of Hazardous Child Labor (2004) allow hazardous work for well-trained children above 16, provided it is not night work. The ESMF details the relevant legislation and a gap analysis with the World Bank ESF. No persons under the age of 18 will be allowed work on any aspect relating to the project.

The Labor Law (1997) includes provisions on Occupational Health and Safety (OHS) mostly consistent with ESS2 of the World Bank's Environmental and Social Framework (ESF). Additional measures must also be taken compliant with WHO guidelines on COVID-19, as outlined in this ESMF.

POTENTIAL LABOR RISKS OF SUBPROJECT

Construction workers engaged in construction of building at NIPH might be risks on their occupational health and safety during work, injury from construction works. It is therefore extremely important that all construction workers that are being able to expose infectious hazardous waste, contact with people come to NIPH for testing Covid-19.

Stages of subproject	**Activities**	**Key Labor Risks**
Construction of building	Construction works to build new lab building at NIPH	• Employment of child labor • Non-discrimination and equal opportunity • Risks of workplace incidents and injuries (operating construction equipment, and handling heavy equipment and materials) • Risks from exposure to hazardous substances (dust, cement, asbestos, chemicals used in construction etc.) • Risks of accidents and emergencies • Sexual Exploitation and Abuse (SEA), Gender Based Violence (GBV) and Violence Again Children (VAC) to workers and community • Risks from exposure to infectious wastes and transmitted viruses

Installation of BSL3	Laboratory wastes	• Risk from incidents and injuries • Risks from exposure to hazardous substances, infectious agents when testing equipment and machines • SEA, GBV and VAC to workers and community • Risks from exposure to infectious wastes and transmitted viruses
Operation of laboratory	Operation of laboratories	• Risk from exposure to hazardous substances, infectious agents, and aerosol during operating lab • Risks from exposure to infectious wastes and transmitted viruses • Risks from exposure without proper PPE used and/or training

POLICIES AND PROCEDURES

Environmental and social impacts during construction are mainly resulting from activities under control of contractors. Thus, the approach is to ensure that contractors effectively mitigate impacts from construction. MOH will incorporate standardized environmental and social clauses in the tender documentation and contract documents in order for potential bidders to be aware of environmental and social performance requirements that shall expected from them, are able to reflect that in their bids, and required to implement the clauses for the duration of the contract. In particular, this will be the relevant aspects of the Environment and Social Risks and Mitigation Measures outlined in the ESCOP.

As a core contractual requirement, the contractor is required to ensure all documentation related to environmental and social management, including the LMP, is available for inspection at any time by MOH. The contractual arrangements with each project worker must be clearly defined.

In addition, MOH will be responsible to ensure that safe messaging around COVID-19 prevention and OHS measures are distributed and available to all project staff directly working for MOH, as per provisions in this LMP.

All project workers must be aware and sign the contractor's Code of Conduct and/or the Individual Code of Conduct (see further below in this Annex for both codes), as applicable.

RESPONSIBLE STAFF

Engagement and management of directed workers. The NIPH and PMD of MOH are responsible for engagement of contractors and installers and their compliances with contract condition.

Engagement and management of contracted workers. The contractors and installers are responsible for management of their workers or subcontracted workers in accordance with this LMP. This includes ensuring compliance with key aspects, providing training in particular those relating to occupational health and safety and COVID-19 prevention, and addressing worker grievances.

LABOR MANAGEMENT

Labor and working conditions

Contractors and installers will arrange and manage working condition of workers in good and safety manner. They shall keep records in accordance with specifications set out in this LMP. MOH requires contractor to record to ensure that labor conditions are met and that prevention mechanisms and other safety issues, general to OHS and specific to COVID-19, are being followed. MoH will review records against actuals at a minimum on a monthly basis and can require immediate remedial actions if warranted. A summary of issues and remedial actions will be included in quarterly reports to the World Bank.

Training of workers

Contractors are required to have a designated safety officer who is available for any mandatory trainings required by MOH, as specified by the contract. The contractor must train workers on OHS

measures, hygiene practices, precautions against COVID-19, and other aspects of LMP as appropriate. Meanwhile MOH must ensure adequate training and materials are provided to direct workers, such as those working on communication materials, screening, etc.

LABOR RISKS MANAGEMENT

Occupational Health and Safety (OHS)

Contractors must designate a minimum of one safety officer and one site supervisor (site engineer) to ensure day-to-day compliance with specified safety measures and OHS, including on precautions against COVID-19. Further to comply with environmental and social commitment, contractors will be responsible and liable for the safety of site equipment, laborers and daily workers attending to the construction site and safety of citizens.

Construction workers shall receive training on OHS as well as COVID-19 prevention and communication with local communities. Training programs should also focus on COVID-19, precaution and prevention measures of MOH, social distancing measures, hand hygiene, cough etiquette and relations with local community. Training programs should also focus, as needed, on COVID-19 reporting and actions on COVID-19 cases in the workforce, communication and public-awareness strategies, project's labor management procedures, stakeholder engagement, grievance mechanism and compliance monitoring and reporting requirements, including on waste management, among others. For details about prevention of COVID-19 in construction please refer to Annex 3 of this ESMP on SAFEGUARD INTERIM NOTE: COVID-19 CONSIDERATION IN CONSTRUCTION/CIVIL WORKS PROJECTS.

The Occupational Health and Safety specifications shall include the following provisions to ensure workplace health and safety standards is full compliance, including:

- Occupational health and safety awareness training to be provided to all workers. At least one supervisory staff trained in safety procedures to be present at all times when construction work is in progress. Training shall cover:
    - Occupation Health and Safety measures
    - Precautions and carefulness during work
    - Emergency control and escape
    - Use of PPE and protective materials
    - COVID-19 prevention and related measures, hygiene, and sanitation
    - Risks and address of exposure to medical wastes
    - Appropriate behaviour with communities, GBV, and VAC;
    - The availability of GRM and how GRM being used
- Management and provision of safety materials and equipment
    - Safe management of the area around operating equipment inside or outside construction camp;
    - Workers shall be equipped with work personal protection equipment (PPE) including hard helmets, gowns, safety boots and protective gloves and/or PPE materials as needed (particularly facemask, handwashing soap, and sanitizer) to protect from COVID-19;
    - Provide PPE as suitable to the task and hazards of each worker, without cost to the worker;
    - Secure scaffolding and fixed ladders to be provided for work above ground level;
    - First aid equipment and facilities to be provided in accordance with the Labor Law;
    - Adequate provision of hygiene facilities (toilets, hand-washing basins), resting areas etc. separated by gender as needed and with distancing guidelines in place; and
    - Install safety equipment such as safe camera, light, heat detector, dust control, ventilated detector.

- Ensuring workplace health and safety standards in full compliance with Cambodia regulations and guidelines including:
    - Basic safety awareness training to be provided to all persons as well as on COVID-19 prevention and related measures;
    - All vehicle drivers to have appropriate licenses
    - Safe management of the area around operating equipment inside or outside hospitals and laboratories;
    - Workers to be provided with PPE equipment as needed (particularly facemask, gowns, gloves, hand washing soap, and sanitizer) to protect from COVID-19;
    - First aid equipment and facilities to be provided in line with the ESMP guidelines on OHS;
    - At least one supervisory staff trained in safety procedures to be present at all times when construction work is in progress; and
    - Adequate provision of hygiene facilities (toilets, hand-washing basins), resting areas etc., separated by gender as needed and with distancing guidelines in place;
- Comply with Cambodia legislation, WB's ESS2 requirements and other applicable requirements which relate to OHS hazards, including WHO specific COVID-19 guidelines. All workers and employees to be aware of their rights under the Labor Law;
    - All workplace health and safety incidents to be properly recorded in a register detailing the type of incident, injury, people affected, time/place and actions taken including COVID-19 cases in the workforce, which should be reported to MOH and the World Bank immediately;
    - All workers (irrespective of contracts being full-time, part-time, temporary or casual) to be covered by insurance against occupational hazards and COVID-19, including ability to access medical care and take paid leave if they need to self-isolate as a result of contracting COVID-19;
    - Procedures confirming workers are fit to work, which may include temperature testing and refusing entry to sick workers (with insurance in place to cover payment, as described above);
    - All work sites to identify potential hazards and actions to be taken in case of emergency;
    - Construction camp need to be safe and hygienic, and with distancing guidelines in place, including provision of an adequate supply of potable water, washing, hygiene, and sanitation facilities;
    - Worker residing at site accommodation to receive training in prevention of infection through contaminated food and / or water, malaria prevention if relevant, COVID-19 prevention and avoidance of sexually transmitted diseases;
    - Workers shall not be allowed to stay at overnight at construction camp at NIPH;
    - Provide educational signs of relevant safe working procedures in a visible area on work sites, in English and local language as required, including on hand hygiene and cough etiquette, as well as on symptoms of COVID-19 and steps to take if suspect have contracted the virus;
    - Fair and non-discriminatory employment practices and equal pay for equal work, regardless whether the person performing the work is male or female;

- All works and employees to be informed of their rights to submit a grievance through the Project Worker Grievance Mechanism;
- All workers and employees to be provided training on appropriate behaviour with communities, gender-based violence and violence against children (also see Codes of Conduct);
- Construction materials manufactured in Cambodia be procured only from suppliers able to certify that no forced labor (including debt bondage labor) or child labor (except as permitted by the Labor Law) has been used in production of the materials; and
- All employees to be aware of their rights under the Labor Law, including the right to organize; and all employees to be provided training on appropriate behavior with communities, gender-based violence and violence against children (also see Codes of Conduct).

Age of Employment

The minimum age of workers to be employed to work will be 18 years and up. This rule will apply for both workers and civil servant. Workers are required to provide proof of their age identity before commencing works on site. Age identity include identification card or certified letter from local authority of their permanence stay.

Terms and Conditions and Equal Opportunities

All terms and conditions as outlined in the World Bank Environmental and Social Framework (ESF) ESS2, paragraphs 10 to 15 apply to contracted workers. In addition,

- In line with national law, the maximum working hours are limited to 8 hours per day, 6 days a week unless there is payment of overtime.
- No discrimination, equal pay for equal work, regardless whether the person performing the work is male or female.
- The wages paid by constructors to the workers shall not be lower than the local Cambodian minimum wage.
- All workers to be covered by insurance against occupational hazards and COVID-19, including ability to access medical care and take paid leave if they need to self-isolate as a result of contracting COVID-19.

MONITORING AND REPORTING

The compliance of contractor to this LMP will be monitored by PMD. The report on LMP compliance should be included in monitoring and supervision reports as stated in monitoring and supervision section of this ESMF. However, contractors must designate one safety officer and one site supervisor (site engineer) to ensure day-to-day compliance with specified safety measures and OHS, including on precautions against COVID-19, and record any incidents for reporting. In case of serious incidents should be reported immediately. Cases of COVID-19, and actions taken, should also be reported immediately.

GRIEVANCE REDRESS MECHANISM (GRM): Addressing workers' grievances

A grievance redress mechanism (GRM) needs to be established within the context/scope of this subproject. This GRM is established to address any complaints that may occur during the subproject implementation. If someone finds out that the project creates negative impact on the community, individual, or environment, s/he can raise a respective grievance and submit a complaint to the Grievance Redress Committee for solution. The GRM has 3 steps.

- Step 1: The complainant discusses respective grievance with the NIPH focal person for a solution;
- Step 2: If the complainant is not satisfied with the solution offered, s/he can raise the grievance to the Project Director (PD);
- Step 3: If both parties are not satisfied with the solution made by the PD, they can go for a legal recourse.

Step 1, 2, and 3 have no cost to the complainant.

The GRM for project workers

There will be a specific Grievance Redress Mechanism (GRM) for project workers as per the process outlined below. This considers culturally appropriate ways of handling the concerns of direct and contracted workers. Processes for documenting complaints and concerns have been specified, including time commitments to resolve issues. All project workers will be informed of the Grievance Mechanism process as part of their contract and induction package.

The process for the Worker GRM is as follows:

- The first step is that an Aggrieved Worker may report their grievance in person, by phone, text message, mail or email (including anonymously if required) to their direct Supervisor as the initial focal point for information and raising grievances. For complaints that are satisfactorily resolved by the Aggrieved Worker or Contractor, the incident and resultant resolution will be logged and reported to the NIPH's Social Focal Point.
- As a second step, where the Aggrieved Worker is not satisfied, the Supervisor (or the complainant directly) will refer the aggrieved party to the NIPH Social Focal Point. Grievances may also be referred or reported to the NIPH Management if appropriate. The NIPH Focal Point endeavors to address and resolve the complaint and inform the Aggrieved Worker as promptly as possible, in particular if the complaint is related to something urgent that may cause harm or exposure to the person. For complaints that were satisfactorily resolved by the NIPH Focal Point, the incident and resultant resolution will be logged by the NIPH Focal Point.
- As a third step, where the complaint has not been resolved, the NIPH Focal Point will refer to the Project Director for further action or resolution.

Up until the third stage there will be no fees for the lodgment of grievances. However, if the complaint remains unresolved or the complainant is dissatisfied with the outcome proposed by the Project Director, the Aggrieved Worker may refer the matter to the appropriate court, at the complainant's own expense. A decision of the Court will be final.

Each grievance record should be allocated a unique number reflecting year and sequence of received complaint (for example 2020-01, 2020-02 etc.). Complaint records (letter, email, record of conversation) should be stored together, electronically or in hard copy. The NIPH Focal Point

will be responsible for undertaking a regular (at least monthly) review of all grievances to analyze and respond to any common issues arising. The NIPH Focal Point is also responsible for oversight of the GRM.

CONTRACTOR MANAGEMENT

The tendering process for contractors will require that contractors can demonstrate their labor management and OHS standards, which will be a factor in the assessment processes.

Contractual provisions will require that contractors:

- Monitor, keep records and report on terms and conditions related to labor management, including specific aspects relating to COVID-19;
- Provide workers with evidence of all payments made, including benefits and any valid deductions;
- Ensuring there is a health and safety focal point, responsible for monitoring OHS issues and COVID-19 prevention and any cases of the virus;
- Keep records regarding labor conditions and workers engaged under the Project, including contracts, registry of induction of workers including Code of Conduct, hours worked, remuneration and deductions (including overtime);
- Record safety incidents and corresponding Root Cause Analysis (lost time incidents, medical treatment cases), first aid cases, high potential near misses, and remedial and preventive activities required (for example, revised job safety analysis, new or different equipment, skills training, etc.);
- Report evidence that no child labor is involved;
- Training/induction dates, number of trainees, and topics;
- Insurance for workers against occupational hazards and COVID-19, including ability to access medical care and take paid leave if they need to self-isolate as a result of contracting COVID-19.
- Details of any worker grievances including occurrence date, grievance, and date submitted; actions taken and dates; resolution (if any) and date; and follow-up yet to be taken. Grievances listed should include those received since the preceding report and those that were unresolved at the time of that report;
- Sign the Contractor's Code of Conduct and/or the Individual Code of Conduct, as applicable.

Monitoring and performance management of contractor with this LMP shall be closely monitored. NIPH and PMD/MOH will be responsible for oversight of labor management provisions as well as contract supervision. The PMD will have overall responsibility on monitoring and analysis of this LMP as part of the Project's M&E efforts. The PMD will monitor the implementation and compliance this LMP including management of worker-related grievances. Monitoring reports should be reviewed and submitted regularly to PIU, who will submit with other monitoring reports to the World Bank.

Annex 5A: Contractor or Installer's Code of Conduct

Instructions: This Code of Conduct should be included in bidding documents for the civil works contractor(s) and in their contracts once hired.

Contractor's Code of Conduct

The contractor is committed to ensuring that the project is implemented in such a way which minimizes any negative impacts on the local environment, communities, and its workers. This will be done by respecting the environmental, social, health and safety (ESHS) standards, and ensuring appropriate occupational health and safety (OHS) standards are met. The contractor is also committed to creating and maintaining an environment where children under the age of 18 will be protected, and where sexual abuse and sexual harassment have no place. Improper actions towards children, Violence Against Children (VAC), sexual abuse/harassment, and/or acts of Gender Based Violence (GBV) will not be tolerated by any employee, sub-contractors, supplier, associate, or representative of the company.

Staff at all levels have a responsibility to uphold the contractor's commitment. Contractors need to support and promote the implementation of the Code of Conduct. To that end, staff must adhere to this Code of Conduct and also to sign the Individual Code of Conduct.

Implementation

a. To ensure maximum visible of the Code of Conduct: Prominently displaying the Code of Conduct in clear view at workers' camps of the workspace.

b. Ensuring all posted and distributed copies of the Code of Conduct are translated into Khmer language of use in the work site areas.

c. Verbally and in writing explain the Code of Conduct to all staff, including in an initial training session.

d. Ensure that:

   (i) All staff sign the 'Individual Code of Conduct', including acknowledgment that they have read and agree with the Code of Conduct.

   (ii) Staff lists and signed copies of the Individual Code of Conduct are provided to the OHS Manager and the PMD.

   (iii) Participate in training and ensure that staff also participate as outlined

   (iv) Put in place a mechanism for staff to: (a) report concerns on ESHS or OHS compliance; and, (b) confidentially report GBV incidents through the Grievance Redress Mechanism (GRM)

   (v) Staff are encouraged to report suspected or actual ESHS, OHS, GBV, VAC issues.

e. Ensure that when engaging in partnership, sub-contractor, supplier or similar agreements, these agreements:

   (i) Incorporate the ESHS, OHS, GBV, VAC Codes of Conduct as an attachment. Clearly state that the failure of those entities or individuals, as appropriate, to ensure compliance with the ESHS, OHS, GBV, and VAC shall not only constitute grounds for sanctions and penalties but also termination of agreements to work on or supply the project.

   (ii) Use appropriate language requiring such contracting entities and individuals, and their employees and volunteers, to comply with the Individual Codes of Conduct.

f. Provide support and resources to create and disseminate staff training and awareness-raising strategy on GBV, VAC and other issues.

g. Ensure that any GBV or VAC complaint warranting Police action is reported to the Police, MOH and the World Bank immediately.

h. Report and act in accordance with the agreed response protocol any suspected or actual acts of GBV or VAC.

i. Ensure that any major ESHS or OHS incidents are reported to MOH and the supervision engineer immediately, non-major issues in accordance with the agreed reporting protocol.

j. Ensure that children under the age of 18 are not present at the construction site, engaged in any hazardous activities or otherwise employed.

k. For training: the contractor are responsible to ensure that staff have a suitable understanding in particular OHS, GBV and VAC aspects and COVID-19 prevention.

Response

l. Contractor will be required to take appropriate actions to address any ESHS or OHS incidents.

m. Regarding GBV:

(i) Maintain the confidentiality of all employees who report or (allegedly) perpetrate incidences of GBV (unless a breach of confidentiality is required to protect persons or property from serious harm or where required by law).

(ii) If a contractor develops concerns or suspicions regarding any form of GBV by one of his/her direct reports, or by an employee working for another contractor on the same work site, s/he is required to report the case using the GRM.

(iii) Once a sanction has been determined by the GRM, the relevant contractor (s) is/are expected to be personally responsible for ensuring that the measure is effectively enforced, within a maximum timeframe of 14 days from the date on which the decision to sanction was made by the GRM.

(iv) If a contractor has a conflict of interest due to personal or familial relationships with the survivor and/or perpetrator, he/she must notify the Company and the GRM. The Company will be required to appoint another contractor without a conflict of interest to respond to complaints.

(v) Ensure that any GBV issue warranting Police action is reported to the Police, MOH and the World Bank immediately.

n. Contractor failing address ESHS or OHS incidents or failing to report or comply with the GBV provisions may be subject to disciplinary measures, to be determined and enacted by the Company. Those measures may include:

(i) Informal warning;

(ii) Formal warning;

(iii) Additional Training;

(iv) Loss of up to one week's salary;

(v) Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months;

(vi) Termination of employment.

o. Ultimately, failure to effectively respond to ESHS, OHS, VAC and GBV cases on the work site by the contractor may provide grounds for legal actions by authorities.

I do hereby acknowledge that I have read the Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, GBV, and VAC requirements. I understand that any action inconsistent with this Code of Conduct or failure to act mandated by this Code of Conduct may result in disciplinary action.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Annex 5B: Individual Worker Code of Conduct

Instructions: This Code of Conduct should be included in bidding documents for the civil works contractor(s) and in their contracts once hired.

I, _____, acknowledge that adhering to environmental, social, health and safety (ESHS) standards, following the project's occupational health and safety (OHS) requirements, and preventing Violence Against Children (VAC) and Gender Based Violence (GBV) is important.

The Contractor considers that failure to follow ESHS and OHS standards, or to partake in activities constituting VAC or GBV—be it on the work site, the work site surroundings, at workers' camps, or the surrounding communities—constitute acts of gross misconduct and are therefore grounds for sanctions, penalties or potential termination of employment. Prosecution by the Police of those who commit GBV or VAC may be pursued if appropriate.

I agree that while working on the project I will:

a. Consent to a background check in any place I have worked for more than six months.
b. Attend and actively partake in training courses related to ESHS, OHS, COVID-19 prevention, VAC and GBV as requested by my employer;
c. Will wear my personal protective equipment (PPE) at all times when at the work site or engaged in project related activities, in particular if related to exposure to COVID-19.
d. Will follow all prevention measures relating to COVID-19, including (i) washing hands with water and soap before and after eating, when entering my work area, after sneezing/coughin, etc; (ii) sneeze or cough on elbow and/or wash hands after sneezing/coughing; (iii) if feeling unwell or have symptoms of a cold, flu or any respiratory illness, inform contractor immediately, stay at home and do not come to work.
e. Implement OHS measures.
f. Strictly follow internal rules of working at construction site
g. Avoid contact or expose to any medical wastes inside NIPH
h. Adhere to a zero-alcohol policy during work activities, and refrain from the use of narcotics or other substances which can impair faculties at all times.
i. Treat women, children (persons under the age of 18), and men with respect regardless of ethnicity, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
j. Not use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
k. Not sexually exploit or abuse project beneficiaries and members of the surrounding communities.
l. Not engage in sexual harassment of work personnel and staff —for instance, making unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature is prohibited: i.e. looking somebody up and down; kissing, howling or smacking sounds; hanging around somebody; whistling and catcalls; in some instances, giving personal gifts.
m. Not engage in sexual favors —for instance, making promises of favorable treatment (i.e. promotion), threats of unfavorable treatment (i.e. loss of job) or payments in kind or in cash, dependent on sexual acts—or other forms of humiliating, degrading or exploitative behavior.
n. Not use prostitution in any form at any time.
o. Not participate in sexual contact or activity with children under the age of 18—including grooming or contact through digital media. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense or excuse.

p. Unless there is the full consent[2] by all parties involved, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex (including prostitution). Such sexual activity is considered "non-consensual" within the scope of this Code.
q. Consider reporting through the GRM or to my contractor any suspected or actual GBV by a fellow worker, whether employed by my company or not, or any breaches of this Code of Conduct.

With respect to children under the age of 18:

p. Bring to the attention of my contractor the presence of any children on the construction site or engaged in hazardous activities.
q. Wherever possible, ensure that another adult is present when working in the proximity of children.
r. Not invite unaccompanied children unrelated to my family into my home, unless they are at immediate risk of injury or in physical danger.
s. Not use any computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography
t. Refrain from physical punishment or discipline of children.
u. No hiring of children for any project activity (no persons under the age of 18).

Sanctions

I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:

v. Informal warning;
w. Formal warning;
x. Additional Training;
y. Loss of up to one week's salary;
z. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months;
aa. Termination of employment;
bb. Report to the Police if warranted.

I understand that it is my responsibility to ensure that the environmental, social, health and safety standards are met. That I will adhere to the occupational health and safety management plan. That I will avoid actions or behaviors that could be construed as VAC or GBV. Any such actions will be a breach this Individual Code of Conduct. I do hereby acknowledge that I have read the foregoing Individual Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, VAC and GBV

[2] **Consent** is defined as the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained using threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even if national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

issues. I understand that any action inconsistent with this Individual Code of Conduct or failure to act mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

ANNEX 6: CHECKLIST FOR ENVIRONMENTAL AND SOCIAL SAFEGUARDS SUPERVISION FOR CONSTRUCTION/RENOVATION

Objectives:

To supervise/monitor status of Environmental and Social Codes Practice (ESCOP) implementation and social safeguards implementation during construction/renovation of NPHL

To suggest time-bound corrective actions for activities which create adverse impacts on the environment and people

Location:	National Institute of Public Health
Person involved:	
Name of other Institution/ Organization involved:	
Filled out by:	
Date:	
Summary of the finding:	

	Question on Environmental- Social Safeguards Implementation	**Yes**	**No**	**Comments/ Information (Propose Time-bound corrective actions if No)**
1.	Unexploded Ordnances' (UXO, landmines, unexploded remnants of remnants etc.) at the construction sites.			
2	Chemicals, sanitary wastewater, spoil waste oil and concrete agitator washings is not deposited in the watercourses.			
3.	No Asbestos based materials are used in the construction			
4.	Asbestos product such as roofing sheets, old structure to be demolished are not stored in the health facilities compound.			
5.	If Asbestos products such as roofing sheets are found on site, or present in old structures that are to be demolished, they must be removed carefully from site, if possible, without breaking. The Asbestos is to be wetted to prevent dust and if any cutting or abrading is necessary, then the material must be kept wet during working to prevent dust.			
6.	The contractor protects sites of known antiquity by placing barriers and fencing to prevent access or damage to the site			

7.	The construction materials/ equipment is stored on site in the property constructed area, in good working condition and do not produce excessive noise			
8.	The demolition activities do not generate visible airborne dust			
9.	The site potable drinking water for construction workers is provided			
10.	The privy facilities available for construction workers are constructed and operational at the sites. The privy is located more than 30 meters of any existing water supply wells/surface water body			
11.	Noise disturbance of patients, HFs staff, residents or surrounded area due to prolong construction			
12.	Request for obtaining an agreement for disposal of construction waste			
13.	Proper location of construction site/camp			
14.	Availability of proper storage for fuel, oil and construction materials			
15.	Proper maintenance of construction machinery and equipment (prevent leakage of fuel, oil, lubricants, etc.)			
16.	Availability of temporary storage areas for excavated and demolished materials and construction wastes within health facility			
17.	Timely removal of excavated and demolished materials and construction waste from the temporary storage areas to planned and agreed places			
18.	Use covered trucks for transportation of construction materials and waste			
19.	Clean the surrounding area from dust by water sprinkling in construction zone (when necessary)			
20.	Clean/ wash tires of vehicles before they get to dwellings and/or drive on highways (when necessary)			
21.	Implementation of works at the established time (e.g. work during daytime 06.00 to 18.00)			
22.	Ensure proper safety of workers at the construction site (e.g. wearing construction helmet or other protective materials)			
23.	Installation of warning signs/safety signs in construction site, worker camps and access roads			
24.	Ensure proper sanitary/ hygienic conditions for workers at the construction site			
25.	Restoration of the area of construction sites and camps when the construction works are over			

26.	Replanting/planting of finished work areas			
27.	The construction site is properly fencing/ proper use of net construction			
28.	Having enough warning signs at danger areas (e.g. construction site, holes, construction wastes storage areas, etc.)			
29.	Electrical equipment and wires are in good conditions and properly kept (no damage, cuts, found in the wire, put it above the ground when it is flooded), proper Personal Protective Equipment (PPE) provided for works expose to electrical hazard. Prohibit works that involve electrical hazard to be carried out during raining or on a wet floor.			
30.	Ensure appropriate and respectful behavior of workers towards individuals in and around the construction area and the surrounding communities (ex. sexual harassment etc.).			
31.	During the construction/ground breaking, etc. in the event of unanticipated discovery of cultural or historical artifacts (human remain, antiquity, sacred artifact etc.).			
32.	Before/during working at height place, the arrangement of scaffoldings, supports, platforms, ladders and handrails to be provided, and using of safety belt be applied.			
33.	Conducting of monthly safety training to the construction workers to each site by the supervision engineers, and always training when the new construction workers recruited to work at sites.			
34.	There is no employment of children under eighteen years old at the construction site.			
Note: (Other issues found related to the social and environmental issues found at the construction sites).				

Checks on Supply Chain

What type of due diligence was carried out in the supply chain?

Questions	Y	N
1. Has the borrower checked the risk of child or forced labor in primary suppliers? If no, go to 8.	☐	☐
2. Has this been checked by asking the primary supplier for information on contracts, hiring practices, etc?	☐	☐
3. Has this been checked by asking other suppliers or companies?	☐	☐
4. Has this been checked by asking NGOs, CSOs or other organizations with knowledge on this area?	☐	☐
5. Has this been checked by asking relevant government departments?	☐	☐
6. Has this been checked by confirming the supplier has necessary licenses or registration?	☐	☐
7. Has this been checked in another way not listed here? Please detail.	☐	☐
8. Was the risk of child or forced labor found in primary suppliers? (if no, go to 12)	☐	☐
9. If yes to 8, please explain the risks and the measures taken.	☐	☐
10. If yes to 8, have remedial steps been taken? If so, please detail.	☐	☐
11. If yes to 10, are the remedial steps being monitored/have they been monitored?	☐	☐
12. Have any primary suppliers been changed or terminated due to a risk of child/forced labor?	☐	☐
Comments		

Date: ……/……/2019

Safeguard Coordinator: Signature
and Name of Implementer

ANNEX 7: LABORATORY BIO-SAFETY CHECKLIST

Annex 7.1: BSL2 Laboratory safety checklist

Location . . . . . Date . . . . . .

Person in charge of laboratory . . . . . .

CHECKED ITEM (ENTER DATE OF CHECK)	YES	NO	N/A	COMMENTS
Biological safety cabinet (BSC)				Date:
Certification within last year	☐	☐	☐	
BSC surface wiped down with appropriate disinfectant at beginning and end of each procedure	☐	☐	☐	Location: Brand:
Front grill and exhaust filter unobstructed	☐	☐	☐	
Open flames used inside cabinet	☐	☐	☐	Type:
Vacuum lines have in-line filters and disinfectant traps in use	☐	☐	☐	Serial no.:
BSC compromised by room air or location	☐	☐	☐	
BSC used when there is potential for creating aerosols	☐	☐	☐	
Laboratory				
Access limited and restricted to authorized personnel	☐	☐	☐	
Entry limited to personnel advised of all potential hazards	☐	☐	☐	
Biohazard sign posted on laboratory door as appropriate	☐	☐	☐	
• Information on sign accurate and current	☐	☐	☐	
• Sign legible and not defaced	☐	☐	☐	
All doors closed	☐	☐	☐	
Decontamination				
Decontaminant specific to the organism(s) in use	☐	☐	☐	
All spills and accidents involving infectious materials reported to the laboratory supervisor	☐	☐	☐	
Appropriate decontaminant used during spill clean-ups	☐	☐	☐	
Work surfaces decontaminated before and after each procedure, daily and after spills	☐	☐	☐	
Handling of contaminated waste				
Infectious waste containers properly used	☐	☐	☐	
Containers not overfilled	☐	☐	☐	
Containers properly labelled and closed	☐	☐	☐	
Culture stocks and other regulated waste properly decontaminated before disposal	☐	☐	☐	

CHECKED ITEM (ENTER DATE OF CHECK)	YES	NO	N/A	COMMENTS
Materials decontaminated outside the laboratory transported in closed, durable, leakproof containers according to local rules and regulations	☐	☐	☐	
Mixed waste biologically decontaminated prior to disposal as chemical or radiological waste	☐	☐	☐	
Personal protection				
Laboratory personnel reminded of appropriate immunizations/tests for agents handled	☐	☐	☐	
Appropriate medical services contacted for medical evaluations, surveillance and treatment of occupational exposures	☐	☐	☐	
Gloves worn when handling infectious material or contaminated equipment	☐	☐	☐	
Face protection provided when working outside the BSC with infectious material	☐	☐	☐	
Hands washed after removing gloves, after working with infectious agents, before leaving the laboratory	☐	☐	☐	
Antimicrobial agent available for immediate first aid	☐	☐	☐	
Practices				
BSC used when potential for creating infectious aerosols/splashes exists	☐	☐	☐	
Biosafety manual prepared and adopted	☐	☐	☐	
Personnel read, review and follow the instructions on practices and procedures, including safety or operations manual (required for all personnel annually)	☐	☐	☐	
Procedures performed so as to minimize aerosols/splashes	☐	☐	☐	
Needle-locking syringes/single-use needle-syringe units used with infectious agents	☐	☐	☐	
Centrifuge cups and rotors opened only in a BSC	☐	☐	☐	
Infectious specimens transported outside a BSC in approved containers following approved transport regulations	☐	☐	☐	
Facility				
Hand-washing sink available near laboratory exit	☐	☐	☐	

Annex 7.2: BSL3 Laboratory Safety Checklist

Location . . . . . Date . . . . . .

Person in charge of laboratory . . . . . .

CHECKED ITEM (ENTER DATE OF CHECK)	YES	NO	N/A	COMMENTS
Facility				
Laboratory separated from unrestricted traffic flow in building	☐	☐	☐	
Access to laboratory through an anteroom with self-closing doors	☐	☐	☐	
All penetrations in laboratory sealed or sealable for decontamination	☐	☐	☐	
Room exhaust air single-pass and exhausted away from occupied areas	☐	☐	☐	
Controlled ventilation system to monitor directional airflow available	☐	☐	☐	
Personal protection				
Closed-front gowns worn in laboratory	☐	☐	☐	
Protective laboratory clothing worn only in laboratory areas	☐	☐	☐	
Hand-washing sink foot, elbow or automatically controlled	☐	☐	☐	
Hand protection				
Double gloves worn when handling infectious material, potentially contaminated equipment and work surfaces	☐	☐	☐	
Respiratory protection				
Respiratory protection worn by all personnel in the laboratory when aerosols are not safely contained in a BSC	☐	☐	☐	
Practices				
Mucous membrane protection provided when working with infectious material outside a BSC	☐	☐	☐	
Personnel advised of special hazards associated with the agent(s)	☐	☐	☐	
Personnel required to read and follow all instructions on practices and procedures, including safety or operations manual ...	☐	☐	☐	
Personnel receive annual updates/additional training for procedural changes	☐	☐	☐	
All contaminated waste autoclaved prior to disposal	☐	☐	☐	