

Environmental Management Plan

Project Number: 51036-002
November 2021

Pakistan: Khyber Pakhtunkhwa Cities Improvement Project

Development of Bagh-e-Naran Park, Peshawar

Prepared by Project Management Unit, Local Government, Elections and Rural Development Department, Government of Khyber Pakhtunkhwa for the Asian Development Bank.

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CURRENCY EQUIVALENTS

As of 18th November, 2021

Currency Unit – Pak Rupees (Pak Rs.)

Pak Rs 1.00 = \$ 0.0057

US\$1.00 = Pak Rs. 175

CONVERSIONS

1 meter = 3.28 feet

1 hectare = 2.47 acre

1 kanal = 0.125 acre

Acronyms

ADB	Asian Development Bank
CC	Construction Contractor
COVID	Corona Virus Infectious Disease
DC	Design Consultant
EE	Environmental Engineer
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
IA	Implementing Agency
ISWM	Integrated Solid Waste management
KP	Khyber Pakhtunkhwa
KPCIP	Khyber Pakhtunkhwa Cities Improvement Project
KP-EPA	Khyber Pakhtunkhwa Environmental Protection Agency
LGE&RDD	Local Government Election and Rural Development Department
NEQS	National Environmental Quality Standards
PMU	Project Management Unit
PO	Park Operator
PPE	Personal Protective Equipment
PRF	Project Readiness Facility
RE	Resident Engineer
REA	Rapid Environmental Assessment
SC	Supervision Consultant
SPS	Safeguard Policy Statement
STD	sexually-transmitted disease
STPs	Sewage Treatment Plants
UCCRTF	Urban Climate Change Resilience Trust Fund
WHO	World Health Organization

NOTE

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

SECTION 1

INTRODUCTION

1.0 Project Overview

1. The Khyber Pakhtunkhwa Cities Improvement Projects (KPCIP) will improve the quality of life of the residents of five KP cities, including Abbottabad, Kohat, Mardan, Mingora, and Peshawar, directly benefitting about 6 million of urban population. KPCIP will help selected cities improve their access to quality urban services through three interlinked outputs: (i) Climate resilient and gender friendly urban infrastructure improve, (ii) Institutional capacities of urban service providers and governments strengthened, and (iii) Increased women's participation in urban governance and access to economic opportunities.
2. KPCIP will support the Government of Pakistan's development priorities, established in (i) the National Water Policy (2018), (ii) the Local Government Act (2019), and (iii) Pakistan Vision 2025. The project is also aligned with ADB's operational priorities of (i) addressing remaining poverty and reducing inequalities; (ii) accelerating progress in gender equality; (iii) tracking climate change, building climate and disaster readiness; (iv) making cities more liveable; and (v) strengthening governance and institutional capacity, outlined in ADB's Strategy 2030, and is included in ADB's country operations business plan for Pakistan, 2021–2023.
3. The project readiness financing (approved in March 2019) has financed the preparation and engineering design of the KPCIP. The Department of Local Government, Elections and Rural Development Department (LGE&RDD), the Government of Khyber Pakhtunkhwa, will be the executing agency for the project and the city governments of the five target cities, including the respective Water and Sanitation Services Companies, will be the implementing agencies.
4. The Project has the following four major components:
 - Improvement of water supply systems in five cities.
 - Development of sewage treatment plants (STPs) in two cities.
 - Provision of Integrated Solid Waste management (ISWM) system in four cities.
 - Development of Urban/Green Spaces in five cities.

5. The Bagh-e-Naran Extension located in Phase 1 of Peshawar City's Hayatabad residential area and it aims to develop the relatively unutilized area into a place of recreation for the surrounding residents and revitalize the area on the whole. The area currently has a moderate vegetation of eucalyptus trees.
6. Although the storm water channel does not normally run the risk of overflowing, in order to withstand any unexpectedly high flows, which are extremely rare, this project will nonetheless also serve to strengthen the capacity of the channel to accommodate even any higher than normal flows of water. Visitors of the existing Bagh-e-Naran and residents of Phase 1, 2, 5 and 8 in Hayatabad will have easy access to the proposed extension.

The location of the proposed park is provided as **Figures 1 and 2** below.

1.1 Project Need

7. There is an ever-increasing demand for recreational spaces for the public in the rapidly expanding city of Peshawar. Existing parks in the city include popular destinations such as Bagh-e-Naran, Tatara Park, Wazir Bagh, Company Bagh, Shahi Bagh and Garrison Park. None of these parks, however, offer outdoor sports facilities or breathing spaces with significant tree plantation. Citizens lack opportunities to adopt healthy active lifestyles and resort to vacant lots and roundabouts to engage in outdoor recreation.
8. The development of extension of Bagh-e-Naran phase 1 of Hayatabad in Peshawar aims to address the lack of outdoor recreational and breathing spaces in the city. The site covers a total area of 13.125 acres (105 kanals) along the banks of Gandao Khwar. It has the potential to be developed as a park for multi-purpose activities such as:
 - Jogging tracks
 - Sports courts (Basketball-2 and Lawn tennis-2)
 - Open air gym
 - Spaces for Families

9. The Park will serve up to 189,049 residents in its immediate vicinity as well as other visitors from Peshawar City. Implementation of the design proposed in this report will improve the environmental quality of the area and meet the public's demand for an outdoor recreational space.

1.2 Project Categorization

10. The sub-project screening and categorization exercise has been conducted and the endorsement of the sub-project category by ADB has been obtained. Since the overall project activities will result in impacts that will mostly be localized, short term and easily manageable through implementation of best management practices, thus this sub-project has been classified as Category 'C' as per ADB SPS, 2009. The REA Checklist is provided as **Annexure A** of this document.
11. Thus, this Environmental Management Plan (EMP) document has been prepared for implementation by the Contractor to ensure compliance with all required measures as per ADB SPS, 2009.

1.4 Components of the Project

12. The following activities are included in scope of the project:
- Tree plantation along boundary.
 - Rehabilitation of drain bank.
 - Permeable parking space for 10 to 15 cars with bioswales.
 - Porous gravel walking track lined with trees and connecting bridges over the drain.
 - Open air gym of 5 to 6 fitness machines and small recreational facilities.
 - Tuck shop.
 - Public washroom, drinking water fountains, benches with charging stations and recycling bins.

1.5 Objective of EMP

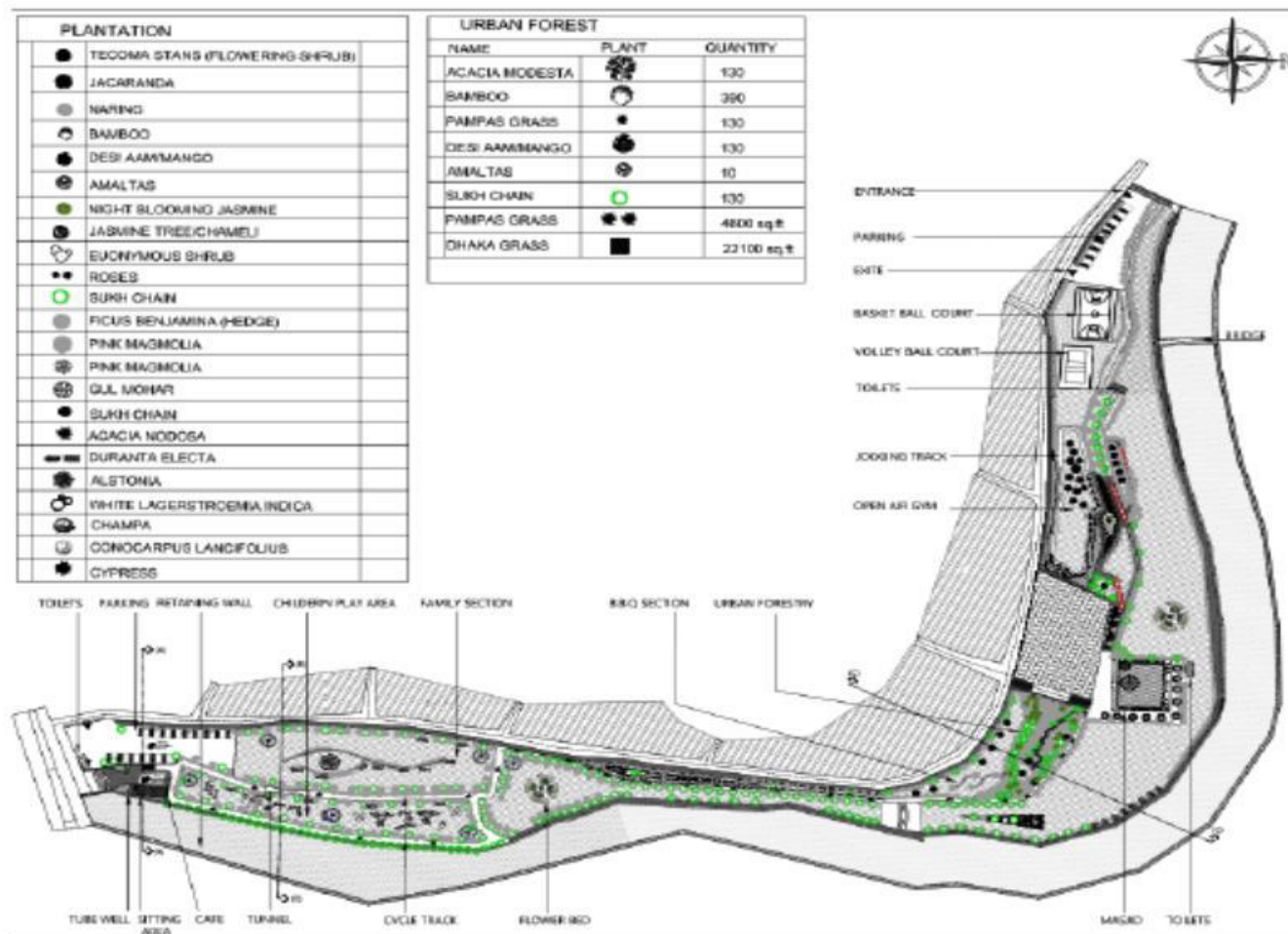
13. The EMP provides an overall approach for managing and monitoring the potential impacts and describes the institutional framework and resource allocations to implement these measures.
14. The main objectives of EMP are to:
- Provide details of the project impacts along with the proposed mitigation measures and the corresponding implementation activities;

- Define the role and responsibilities of the Project Proponent, Contractor, Supervisory Consultants and other role players and effectively communicate environmental issues among them;
- Define a monitoring mechanism, reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented;
- Identify the resources required to implement the EMP and outline the corresponding financing arrangements;
- Keeping in view the recent COVID-19 pandemic, specific health and safety measures and work practices have been provided to ensure occupational and community health and safety as far as possible and minimize the potential risk of infection and/or its transmission.

Figure 1: Project area map of Bagh-e-Naran Extension Park



Figure 2: Master Plan for Extension of Bagh-e-Naran Park



SECTION 2

PROJECT DESCRIPTION

2.1 Component Wise Project Scopes and Objectives

15. The scope and objectives of the project are provided in **Table 2.1** below.

Table 2.1: Project Scope and Objectives

	Scope	Objectives
1.	Urban forestry & row plantation (plantation of over 18,500 trees, shrubs & flowers)	<ul style="list-style-type: none"> ▪ O₂ production and air purification ▪ Absorption of Greenhouse Gases (CO₂, CH₄ etc.) ▪ Cooling effect on pathways from tree shading ▪ Clean and green environment
2.	Jogging tracks with open air gym	<ul style="list-style-type: none"> ▪ Identify strategies that can help lead to establish healthy habits
3.	Recreational facilities for children	<ul style="list-style-type: none"> ▪ Healthy social interactions ▪ Physical exercise ▪ Improved quality of life
4.	Food services & outdoor entertainment platforms	<ul style="list-style-type: none"> ▪ Revenue generation ▪ Promotion of art & culture ▪ To promote a sense of urban vitality in the community
5.	Retention wall for flood protection	<ul style="list-style-type: none"> ▪ Adaptation to climate change ▪ Reduced exposure to environmental hazard (i.e. flooding)

16. The project construction will incorporate the conservation of existing trees. Most of proposed infrastructure facilities are planned on those spots on site that contain no existing trees.

2.2 Site Description

17. The description of the proposed site based on the field observations made during visits to the site are summarized below:
- Gandao Khwar is a seasonal hill torrent with Eucalyptus tree plantation that runs along the southern boundary of the selected site (Picture 1). A hydrology study would be required to ascertain the extent of seasonal flash floods and existing trees will be considered for preservation in the design.



Picture 1: Eucalyptus Tree Plantation and Gabion Wall of Gandao Khwar

- There is a compacted solid waste dump on the southern section of the site. Appropriate waste removal or remediation interventions will be required prior to any construction on the compacted waste surface. The main access road to the site is the Lalazar avenue, which enters the secondary road Murghuzar. A plumb wall for flood protection extends across approximately half the length of the Gandao Khwar. The design proposal will consider improving flood protection measures for public safety.



Picture 2. Breakage in existing footpath due to land subsidence

2.4 Design Features of Proposed Park

18. Based on the detailed design for the proposed park, the facilities and their respective descriptions are provided below:

- **Permeable walkway:** 67,955 sq.ft of walkway paved with tuff tiles have been proposed as illustrated in the masterplan. 8 steel trellises will cover segments of the walkway.
- **Family area:** This section consists of a cycling track for children, skating zone, playground with swing sets, sand pits for toddlers, sitting spaces and a labyrinth.
- **Amphitheatre:** Designed to hold performing art events and cultural activities such as traditional Attan dance and schoolchildren.
- **Open air gym:** The gym will be accessible to all and will have 10 immovable exercise machines.
- **Seating furniture:** 8 gazebos (steel), 50 straight benches with back support (steel & wood), 50 guardrails (concrete) and 2 circular benches (concrete and bricks).
- **Two parking spaces:** The parking lots will have surface areas of 19,000 sq.ft and 13,500 sq.ft each. The surfaces of the lots will have three layers: course asphalt, course aggregate and sub-grade.
- **Urban forest:** This segment will be characterized by dense tree plantation of Acacia Modesta and Mango Trees.
- **Sports facilities for adults:** A 4,000 sq.ft volleyball court and 7,280-sq.ft basketball court, both with synthetic surfaces of vibrant colours, will be developed to encourage adults to engage in sports.
- **Gates, boundaries and flood protection:** The Park will have three main gates and its boundary will be fenced. A 4-meter high retaining wall will be constructed along the Gandao Khwar for protection against seasonal flash floods.
- **Services:** 5 tuck shops, 1 service area and 2 public washrooms will be constructed.
- **Plantation:** A rose garden, seasonal flower beds, row plantation and boundary plantation will beautify the park. Trees will play a role providing shade and keeping the area cool.

19. The project design layouts are provided as **Figures 3 to 6** below.

Figure 3: Proposed Master Plan for Extension Works

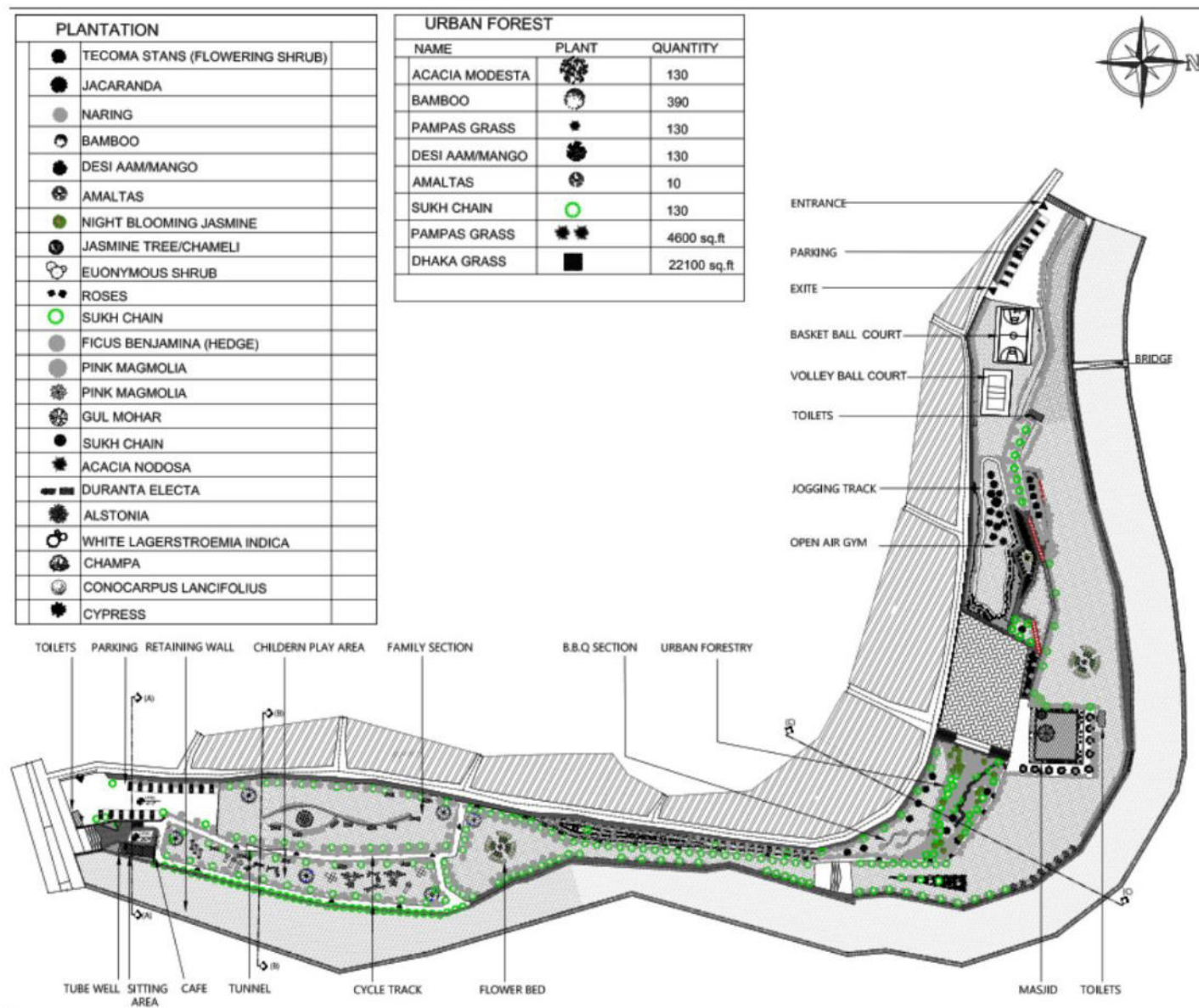


Figure 4: Cross Section 1 of Park Extension

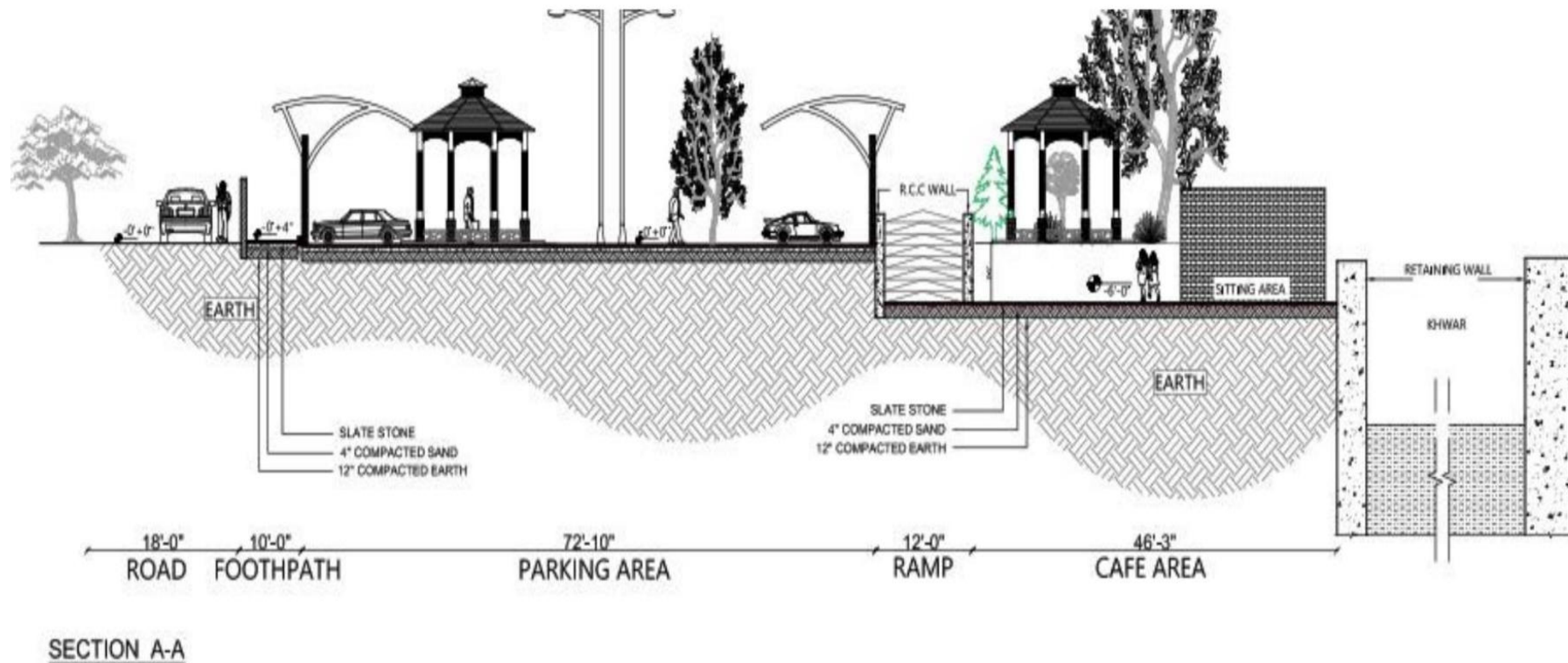


Figure 5: Cross Section 2 of Park Extension

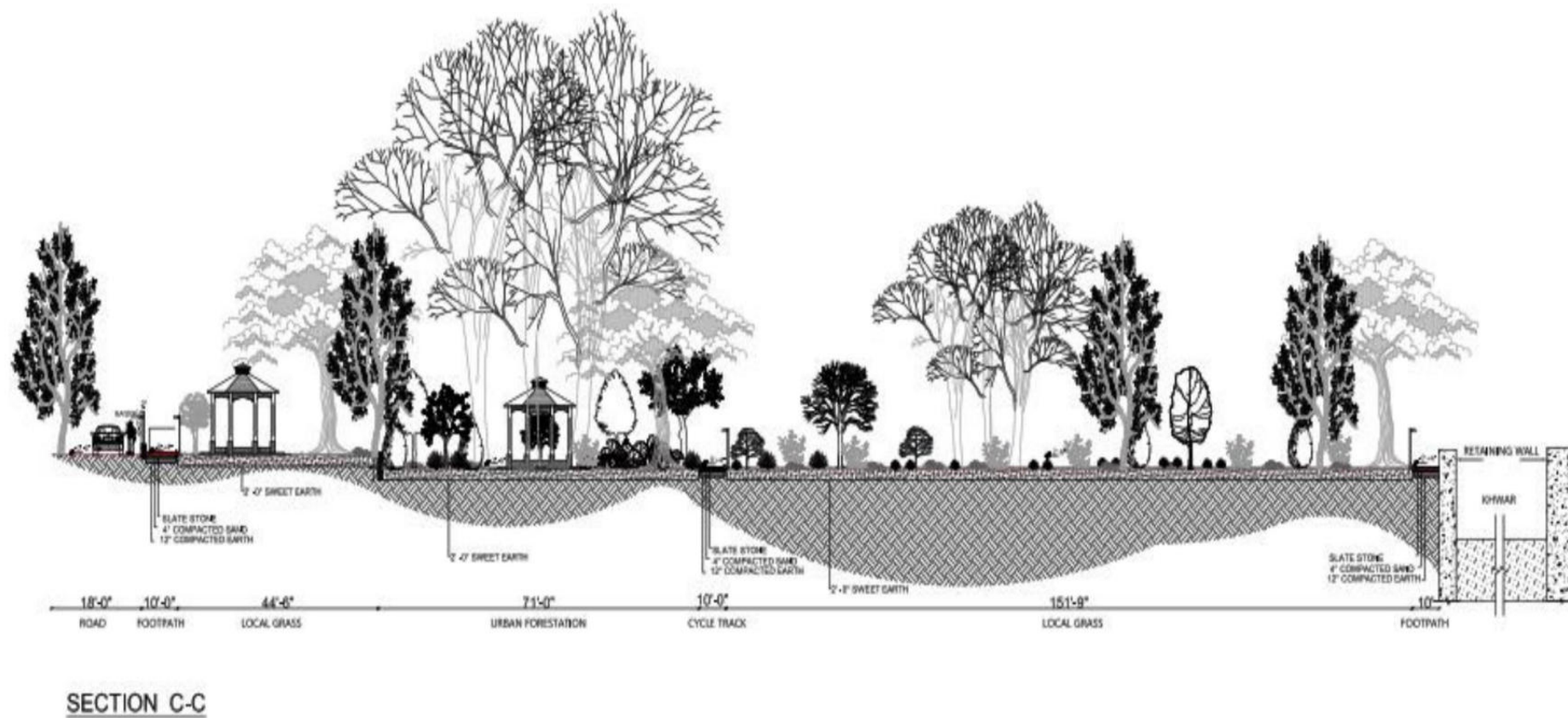
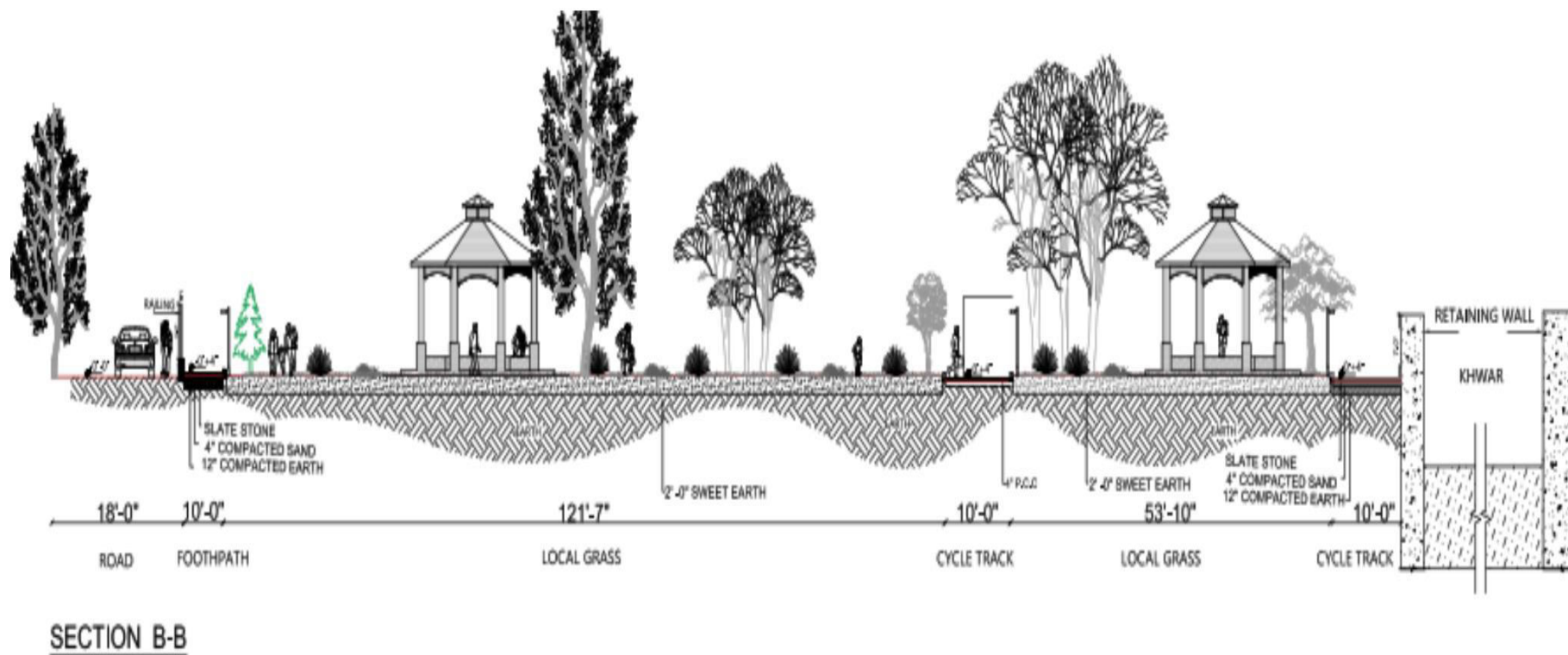


Figure 6: Cross Section 3 of Park Extension



2.5 Stakeholder Consultations

20. Several consultative sessions were held between the Peshawar city management and the KPCIP team including the Project Director (PMU-KPCIP), Project Officer (PMU-KPCIP), Architects and Planners from EDCM-KPCIP to define the scope of work for the project.
21. Focus Group Discussions (FGD) with residents of Peshawar were carried out. Keeping in view the cultural dynamics of the area, separate consultations were conducted with male and female groups within community. The views, concerns and suggestions of participants have been summarized below:
- There shall be colorful flowers for beautification. Plant a variety of beautiful and colorful flowers to enhance the beauty of the complex.
 - Walking and running tracks are already being made.
 - Most of the local school children come to play in this ground, the seating capacity shall be increased, and shade shall be provided, so that the children can sit comfortably in the shade and enjoy watching the game
 - Sprinkle water system is required for the grounds, so that the ground can be easily irrigated with water and the lawn will remain green and lush.
 - Tuck shop is required.
 - Public washroom shall be provided.

2.6 Climate Change Risks

22. The different features of Bagh e Naran Park are designed in line with the natural contour without disturbing the topography of the site. In the design, no storm water pumping system has been proposed. For rain water drainage, the drainage system is based on the “nature-based solution”, concreted lined drains are provided to carry away the excess water. Also, spaces in depression areas are planned to be kept as they are to act as spaces for the ponding of rainwater to stay for a day or more and enable groundwater recharge. There is no rainwater flooding expected in the park.
23. There are no cyclones observed and projected in the project area, however, infrastructure will be constructed to withstand high speed winds (if any).

SECTION 3

INSTITUTIONAL ARRANGEMENTS AND CAPACITY BUILDING

3.0 General

24. The main purpose of the EMP is to provide a strategy for environmental protection. According to EMP, all the activities associated with the project will be controlled and monitored during the design, construction and operation phase. EMP will propose a plan of actions that will indicate responsibilities and required measures to prevent or minimize the potential environmental impacts.

3.1 Organizational Set-up for Implementation of EMP

25. The following functionaries will be involved in the implementation of EMP;

- Program Management Unit (PMU);
- Supervision Consultant's Environmental Engineer;
- Contractor's Site Environmental Engineer; and
- KPK EPA (Regulatory Authority)

Organizational set-up for implementation of EMP is shown in **Figure 3.1** below.

26. The PMU will be overall responsible for implementation of this EMP and for the environmental management and supervisory affairs during the construction phase of the proposed project. For effective environmental management, the PMU will assign the necessary responsibilities through Project Director, to an Environmental Expert and a Social Expert in implementing the mitigation measures proposed in EMP.
27. The Contractor will be responsible for the implementation of EMP under the Supervision Consultant. The Contractor shall be bound to follow the provisions of the Contract documents, especially about environmental protection and apply good construction techniques and methodology without damaging the environment. Obligation of the Contractor is to safeguard, mitigate adverse impacts and rehabilitate the environment shall be addressed through environmental provisions in the Contract document and through adequate implementation at site. Regulatory Authority will be responsible for compliance of implementation of EMP.

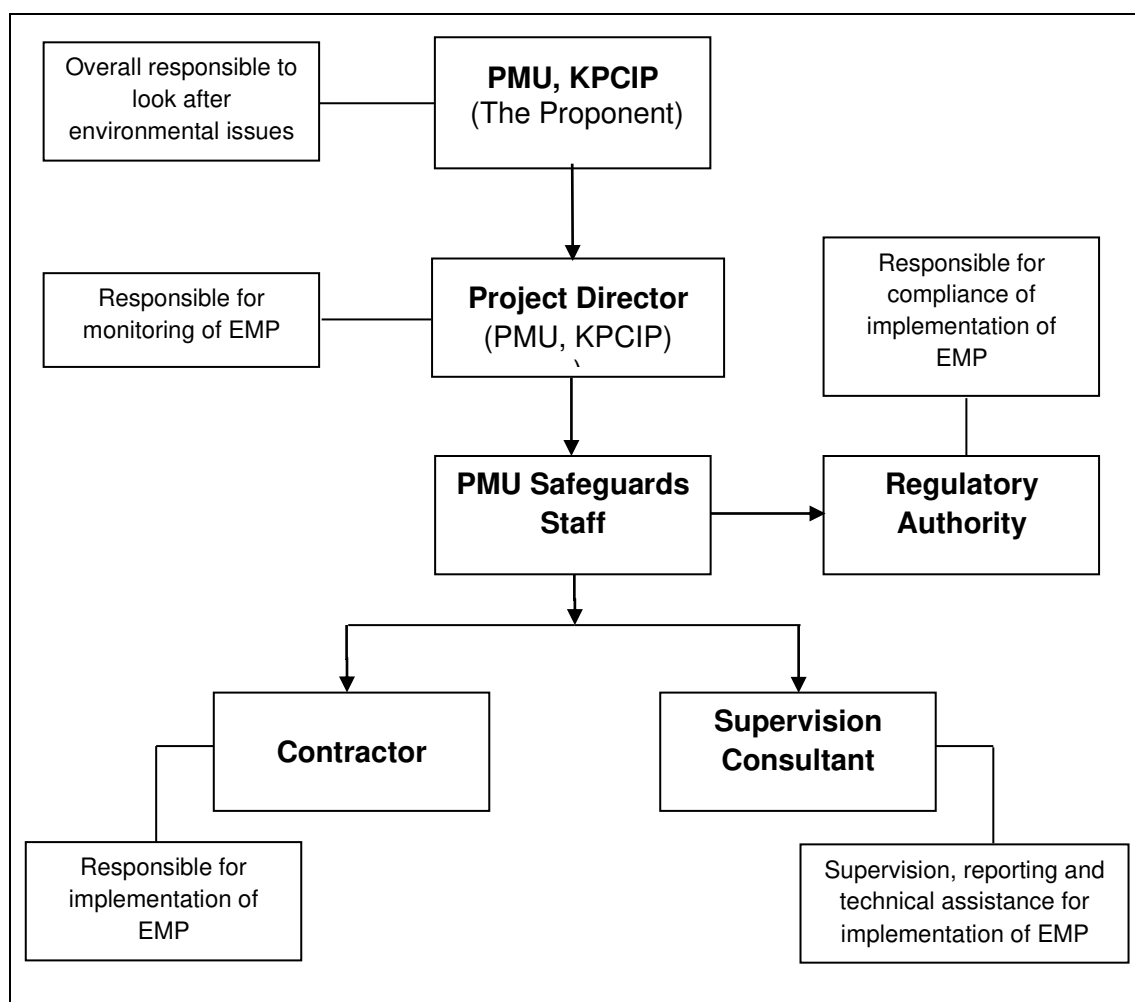


Figure 3.1 Organizational Setup for Implementation of EMP

3.2 Role and Responsibilities of PMU

3.2.1 Program Management Unit (PMU)

28. Design and Construction of the project is the core responsibility of PMU, KPCIP. The major role and responsibilities related to environment and social tasks are as follows:

- To ensure that the Project design and specifications adequately reflected in the EMP.
- To ensure the Project compliance with the environmental regulations and donor requirements;
- To ensure that the TOR for the Supervisory Consultants adequately cover the environmental and social issues; and

3.2.2 Project Director (PD)

29. The specific responsibilities of Project Director are as follows:

- Setting up systems for environmental management;

- Ensuring that the Contractor(s) develop and carry out environmental implementation Plans that are consistent with the EMP;

3.2.3 Responsibilities of Environmental Engineer of Supervision Consultant

30. The Environmental Engineer (EE) of the Supervision Consultant (SC) will oversee the performance of Contractor through periodic monitoring to make sure that the Contractor is carrying out the work in accordance with EMP.

31. The EE of SC will provide guidance to the Contractor's Environmental Engineer for implementing each of the activities as given in the EMP. The EE of SC will be responsible for record keeping providing instruction through the Resident Engineer (RE) for corrective actions and will ensure the compliance of various statutory and legislative requirements. The EE will maintain close coordination with the Contractor and PMU for successful implementation with environmental safeguard measures. However, overall responsibilities of EE of SC are as follows:

- Directly reporting to the RE;
- Discussing various environmental issues and environmental mitigation, enhancement and monitoring actions with all concerned directly or indirectly;
- Inspect, supervise and monitor all the construction and allied activities related to the EMP for the project;
- Assist the RE to ensure the environmental sound engineering practices;
- Assisting contractor and PMU in all matters related to public contacts including public consultation pertaining to environmental and community health & safety issues;
- Assisting PMU Safeguards staff to carry out environmental monitoring;
- Organizing training to the EE of Contractor and field staff; and
- Preparing and submitting monthly and quarterly environmental progress/ compliance reports to the PMU.

3.4 Responsibilities of Site Environmental Engineer of Construction Contractor

32. The Site Environmental Engineer of Construction Contractor will carry out the implementation of mitigation measures at construction site. Construction Contractor will be bound through Contract documents to appoint the Site Environmental Engineer with relevant educational background and experience. Responsibilities of EE of Contractor are as follows:

- Preparing sub plans including monitoring plan, traffic control/diversion plan, site rehabilitation plans etc. and will submit all the plans to the EE of SC.

- Implementation of EMP and to take effective measures against corrective actions plan;
- Preparing the compliance reports as per schedule and will submit it to the SC;
- Providing proper Personal Protective Equipment (PPEs) to the workers and train them for their proper use; and
- Providing environmental and health & safety trainings to the workers /labor.

3.5 Non-Compliance of the EMP

33. The implementation of the proposed EMP involves inputs from various functionaries as discussed earlier. The Contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the EMP, which will be part of the Contract documents. The provision of the environmental mitigation cost will be made in the total cost of project, for which Contractor will be paid on the basis of monthly compliance reports. The Contractor will not be allowed to proceed further until the mitigation measures as proposed in the EMP are taken and approved by Supervision Consultant.

3.6 Environmental Technical Assistance and Training Plan

34. In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. The SC will play a key role in this respect and supervise the arrangements of trainings.
35. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP as without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures. A suitable training program is proposed to train the Contractor(s) staff who will be involved in the Construction Phase and the professional staff from the client involved at the operational stage of the project.
36. The PMU, KPCIP will engage consultants to manage the environmental training program. The objective of engaging these consultants will be to help in establishment of appropriate systems, and to train senior project staff and Environmental Expert responsible for managing environment, operations, and planning. The details of this training program are presented in **Table-3.1**.

Table-3.1: Personnel Training Program

Provided by	Contents	Trainees/Events	Duration
Consultants/ organizations specializing in environmental management and monitoring	Short seminar and a course on: Environmental laws and regulations, daily monitoring and supervision	One seminar for PMU and contractor project staff	1 day
Consultants/ organizations specializing in social management and monitoring	Short seminar and course on: Social awareness	One seminar for project staff dealing in Social/land matters	1 day
Consultants/ organizations specializing in Occupational, health and safety issues	Short lecture relating to Occupational Safety and Health	One seminar for contractor's staff	2 days

SECTION 4

ENVIRONMENTAL MANAGEMENT PLAN

4.0 General

37. The Environmental Management Plan (EMP) provides the framework for the implementation of the mitigating measures and environmental management and monitoring during the construction and operation phases of the proposed project. The proper implementation of the EMP will ensure that any adverse environmental impacts are adequately mitigated, either totally prevented or minimized to an acceptable level and required actions to achieve those objectives are successfully taken by the concerned institutions or regulatory agencies.
38. The implementation of EMP will be carefully coordinated with the design, construction and operation programs of the project to ensure that relevant mitigation measures are implemented at the appropriate stage and adequate resources are properly allocated to achieve the desired results.
39. The **Table 4.1** depicts impacts, targets, mitigations and the responsible authorities for the implementation of the mitigation measures during design, construction and operational phases.

Table-4.1: Environmental Management Plan

Sr. No.	Parameters	Target	Mitigation	Responsibility
Design/pre-construction Phase				
1	Design & Layout Planning	Intended to enhance the park aesthetic and focused on certain project structures	<ul style="list-style-type: none"> All structural, layout and engineering designing of project shall be strict in accordance with the applicable by laws and engineering parameters. 	PMU, KPCIP
2	Drainage	To prevent flooding and pooling	<ul style="list-style-type: none"> Provision of appropriate drainage structures and stormwater pumping station; and Proper slopes shall be incorporated in design feature to avoid the formation of the water layer on road surfaces in rainy seasons. 	PMU, KPCIP
3	Public Utilities	To avoid disturbance to the public.	<ul style="list-style-type: none"> The design engineer shall consider the adjustments of the proposed plans, where feasible and within acceptable design standards, to avoid relocation or adjustment of major or costly utilities without changing the scope of the project. The design engineer shall consider the feasibility and possible choices of electrical works and installation of lights keeping in view health and safety of workers and general public. 	PMU, KPCIP
4	Seismic Hazard	To minimize the structural damage	<ul style="list-style-type: none"> The proposed building and structures will be designed and constructed to withstand 	PMU, KPCIP

Sr. No.	Parameters	Target	Mitigation	Responsibility
			low to moderate earthquakes. For seismic hazard analysis, updated structural and seismic evaluations will be consulted.	
5	Traffic Management	To minimize traffic problems in the project area	<ul style="list-style-type: none"> Proper traffic management plan shall be formulated and announced before construction to avoid traffic jams/public inconvenience; Plan the timing for movement of construction materials carrying vehicles to reduce traffic load and avoid inconvenience to the local residents. Means of communication of recommended alternative routes shall be planned to avoid inconvenience and traffic blockades during construction 	PMU, KPCIP
6	Health and Safety	To minimize health risks	<ul style="list-style-type: none"> Preparation of health and safety plan to minimize health risks; and An emergency response plan shall be formulated which emphasizes line of action for rescue, medical emergencies, natural disasters and firefighting operations. 	PMU, KPCIP
7	Solid Waste Management	To manage (i.e. collect and dispose) the solid waste safely at appropriate sites.	<ul style="list-style-type: none"> Incorporate technical design features for refuse collection at sites that would minimize burning impacts; and Devise plan(s) for safe handling, storage and disposal of harmful materials 	PMU, KPCIP

Sr. No.	Parameters	Target	Mitigation	Responsibility
Construction Phase				
1	Topography	To make ensure minimum changes in topography of the project area.	<ul style="list-style-type: none"> Excavations shall be kept confined to the specified location as per the approved engineering drawings and unnecessary excavations shall be avoided. 	CC, SC
2	Soil	To minimize soil erosion and contamination.	<ul style="list-style-type: none"> All spoils shall be disposed off as desired and the site will be restored back to its original conditions; Unnecessary excavations shall be avoided; Septic tanks of adequate capacities will be constructed for receiving and treating wastewater from all temporary worksite toilets and at the temporary container offices, if any. The toilet wastewater shall not be discharged untreated onto the adjacent lands/sewers/disposal station; and Washout from washing of equipment and gadgets will be drained into either a septic tank or a sand-gravel bed for removal of the grit and contaminants. 	CC, SC
3	Camp Site	To minimize loss of assets and vegetation due to labor movement and to prevent degradation of environment due to construction camps.	<ul style="list-style-type: none"> Preparation of Waste Management Plan addressing the classification, storage and disposal of all solid wastes and the training of employees for handling the hazardous materials. Training will be provided to all staff 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			members on camp management rules and overall discipline and cultural awareness.	
4	Health and safety of workers and associated communities	To minimize health risks	<ul style="list-style-type: none"> ▪ Obligatory insurance against accidents for laborers/workers shall be ensured; ▪ Basic medical training shall be imparted to specified work staff and basic medical service and supplies to workers; ▪ Layout plan for camp site, indicating safety measures taken by the contractor, e.g. fire fighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; ▪ Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for laborers; ▪ Protection devices (ear muffs) shall be provided to the workers doing job in the vicinity of high noise generating machines; ▪ Provision of protective clothing for laborers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles and gloves etc; ▪ Ensure strict use of wearing these protective clothing during work activities; ▪ Emergency number shall be placed at worksites; ▪ Elaboration of contingency planning in 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>case of major accidents;</p> <ul style="list-style-type: none"> ▪ Instruct construction supervisor to strictly enforce the keeping out of non-working persons, visitors, particularly children, off work sites; and ▪ Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads. ▪ There shall be proper control on construction activities and oil spillage leakage of vehicles; ▪ The labor staff with any transmittable diseases shall be restricted within the construction site; ▪ Efforts will be made to create awareness about road safety among the drivers operating construction vehicles; ▪ Timely public notification on planned construction works; ▪ Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots; ▪ Setting up speed limits in close consultation with the local stakeholders; ▪ The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as HIV/AIDS, shall be prevented by successful initiative typically involving 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>health awareness; education initiatives; training of workers in disease treatment; immunization program and providing health service; and</p> <ul style="list-style-type: none"> Reducing the impacts of vector borne diseases on long-term health effect of workers shall be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which includes Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements and by eliminating any unusable impounding of water. 	
5	Air Pollution	To minimize air pollution	<ul style="list-style-type: none"> All excavation work will be sprinkled with water to control dust; The excavated material shall be covered and shall not be stored for long intervals; All vehicles, machinery, equipment and generators used during construction activities shall be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; All vehicles, machinery and equipment used for the construction shall be plugged off or switched off immediately after completion of their work to avoid idling condition; 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<ul style="list-style-type: none"> Filter shall be installed at the point sources (machinery or equipment) of air emissions and shall be replaced regularly; Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions; Open burning of solid waste from the Contractor's camps shall be strictly banned; Preventive measures against dust shall be adopted for on-site mixing and unloading operations. Regular water sprinkling of the site shall be carried out to suppress excessive dust emission(s); Construction workers shall be provided with masks for protection against the inhalation of dust; and PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery shall be enforced during construction works. 	
6	Noise and Vibration	To minimize noise pollution	<ul style="list-style-type: none"> Selection of up-to-date and well-maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or appropriate muffling devices; Confining excessively noisy work to normal working hours in the day, as far as 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>possible;</p> <ul style="list-style-type: none"> ▪ Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use; ▪ Preferably, restricting construction vehicles movement during night time; ▪ Avoid use of heavy drill machines to avoid the vibration effect on the historical buildings. ▪ Vehicles and equipment used shall be fitted, as applicable, with silencers and properly maintained; ▪ Use of low noise machinery, or machinery with noise shielding and absorption; ▪ Contractors shall comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures 	
7	Construction Waste and Hazardous Waste	To minimize the construction and hazardous waste	<ul style="list-style-type: none"> ▪ Wastewater effluent from contractor's workshop and equipment washing yards would be passed through gravel/ sand beds to remove oil/ grease contaminants before discharging it into natural streams; ▪ Training of working force in the storage and handling of materials and chemicals that can potentially cause soil contamination; ▪ Solid waste generated during construction 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;</p> <ul style="list-style-type: none"> ▪ Burning of waste will be prohibited; ▪ Proper labelling of containers, including the identification and quantity of the contents, hazard contact information etc.; ▪ Training employees involved in the transportation of hazardous material regarding emergency procedures; ▪ Providing the necessary means for emergency response on call 24 hours/day; ▪ The sewage system for camps will be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters; and ▪ Lined wash areas will be constructed at site, for the receipt of wash waters from construction machinery. ▪ Covering material during heavy rainfall; ▪ Locating stockpiles to minimize potential visual impact, and ▪ Minimizing land intake of stockpiles areas as far as possible. 	
8	Resource Conservation	Sustainable use of energy resources	<ul style="list-style-type: none"> ▪ Wastage of water shall be controlled through providing proper valves and through controlling pressure of the water; ▪ Water jets and sprays shall be used for 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			watering surfaces rather than using overflow system; <ul style="list-style-type: none"> Source of water shall be carefully selected. Water use shall not disturb the existing community water supplies; Reuse of construction waste materials; Unnecessary equipment washings shall be avoided; A good camp design and an efficient worksite management plan can help the contractor to reduce the water demand to the lowest levels 	
9	Energy Efficiency	To minimize energy efficiency	<ul style="list-style-type: none"> Ensure adequate insulation to reduce heat loss through batching plants; Regularly monitor CO and CO₂ content of the flue gases to verify that combustion systems are using practical excess air volumes; Maintain clean heat transfer surfaces in asphalt batching plant; 	CC, SC
10	Surface and Groundwater	To protect the ground and surface water resources from any kind of pollution due to project	<ul style="list-style-type: none"> Protection of surface and groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality; Wastewater effluent from contractor's workshop and equipment washing yards shall be passed through gravel/ sand beds to remove oil/ grease contaminants before 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>discharging it into natural streams</p> <ul style="list-style-type: none"> ▪ The solid waste will be disposed off in designated landfill sites to sustain the water quality for domestic requirements; ▪ water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected; ▪ For construction purposes, water shall be drawn from surface water bodies on priority and as available; ▪ Regular water quality monitoring according to determined sampling schedule; ▪ The contractor shall ensure that construction debris do not find their way into the drainage network, which may get clogged; ▪ To maintain the surface water flow/drainage, proper mitigation measures will be taken, like drainage structures ▪ Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond; ▪ Construction work close to the streams or other water bodies will be avoided, especially during monsoon period; ▪ Take precautions construct temporary or permanent devices to prevent water pollution due to increased siltation; and 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<ul style="list-style-type: none"> Waste must not be disposed off into any surface water body. 	
11	Flora and fauna	To minimize the impact on flora and fauna	<ul style="list-style-type: none"> The Contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes; and Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed. Hunting, poaching and harassing of animals will be strictly prohibited and Contractor will warn their labor accordingly; The camps will be properly fenced and gated to check the entry of animals in search of eatable goods. Similarly, waste of the camps will be properly disposed off to prevent the chances of eating by animals, which may become hazardous to them; Special measures will be adopted to minimize impacts on the birds, such as avoiding noise generating activities during critical periods of breeding; Staff working on the project shall be given clear orders, not to shoot, snare or trap any bird. 	CC, SC
12	Public Utilities/ Infrastructure	To minimize the disturbance to public utilities and infrastructure	<ul style="list-style-type: none"> All public utilities likely to be affected by the proposed project need to be relocated well ahead of the commencement of 	CC, SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			construction work; <ul style="list-style-type: none"> Unnecessary excavation shall be avoided; and Excavations shall be carried out carefully to avoid damaging infrastructure in the surroundings of the project area. 	
13	Traffic Management	To minimize traffic problems in the project area	<ul style="list-style-type: none"> Proper traffic management plan will be needed to avoid traffic jams/public inconvenience; Movement of vehicles carrying construction materials shall be restricted during the daytime to reduce traffic load and inconvenience to the local residents; Availability of continuous services of the Traffic Wardens in the diversion and control of traffic; and; The executing agency is required to maintain liaison between the Traffic Police, local residents/visitors, travelers and the contractor to facilitate traffic movement during construction stage. 	CC, SC and Traffic Police
14	Communicable diseases	To minimize the spread of corona virus	COVID-19 specific measures <ul style="list-style-type: none"> All workers must perform complete sanitization at the site as per SOPs/guidelines issued by WHO. All workers must wear a mask as soon as they arrive at site and must keep wearing it at all times while present at the work site/hospital premises. 	CC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<ul style="list-style-type: none"> As soon as workers arrive at work site, their body temperature must be checked and in case any worker is assessed to be running a fever or suffering from a flu or cough, he must be informed to leave immediately and self-isolate for a two-week period and not report for work until this two-week mandatory period has been completed. At the work site(s), social distancing measures must be strictly implemented and gathering of workers at any location at the work site(s) must be strictly forbidden. In case of workers not taking this measure seriously, strict penalties must be imposed to ensure implementation. The work tasks must be divided into shifts, as far as possible, to reduce the workforce present at the work site(s) at any one moment and improve the working speed/efficiency. All workers will be strictly advised to wash their hands as frequently as practicable and not to touch their face during work. A supply of safe drinking water will be made available and maintained at the project site(s). COVID awareness sign boards must 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>be installed at the clinic premises and at the work site(s).</p> <ul style="list-style-type: none"> Contact details of all workers will be kept in a register on site in order to efficiently trace and manage any possible workers that might experience symptoms of COVID-19. Prohibition of entry for local community/any unauthorized persons at work sites. Proper hygiene practices in the toilets and washrooms will be implemented with proper and adequate use of soaps and disinfectant spray. Social distancing must be maintained during the pick-up and dropping off of workers from their residences to and from the work site(s). <p>COVID-19 specific measures GOP</p> <p>Advice for Site Managers:</p> <ul style="list-style-type: none"> Every construction project shall make proper arrangements for uninterrupted building services including but not restricted to, electricity, fuel, water supply, water disposal and sanitation, communication links, washrooms with hand hygiene and shower facility and with proper and adequate supply of soaps and disinfectants. Workers shall not use biometric attendance machines or crowd during 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>attendance, entry or exit to the premises of the construction site.</p> <ul style="list-style-type: none"> ▪ Ensure the availability of the thermal gun at the entry and exit of the construction site and no worker shall be allowed without getting his/her temperature checked. ▪ Site manager must maintain a register of all contact details with NID number and addresses of all present at the site in case a follow up or tracing and tracking of contacts is required at a later stage. ▪ Develop the employee roster to decrease the number of people on the site very day. Split the shifts of the workers in morning and evening with limit of each shift to 8 working hours. ▪ Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours' end. ▪ In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must be provided with a face mask. It must be ensured that everyone during his or her presence at the site continues to wear the mask. Face mask shall be replaced as and 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>when soiled or otherwise removed. Outer surface of face mask must not be touched with hands.</p> <ul style="list-style-type: none"> ▪ Non-essential work trainings must be postponed avoiding gathering of people. ▪ Ensure the physical distance by creating more than one route of entry and exit to the site. ▪ Instruct the workers to inform the construction manager (or authorities) if ▪ They develop any symptoms of cough, flu or fever. ▪ They have been exposed to someone suspected or confirmed with COVID 19. ▪ They have met someone who has a travel history of COVID 19 endemic country. They have travelled in last couple of days or plan to travel soon. ▪ All incidences of appearance of the symptoms of COVID-19 shall be immediately documented and maintained at the site and information regarding which shall be immediately communicated through e-mail or else, to the designated health facility, and the sick worker shall be transported to the health facility for further advice and action. The site manager must establish a link with a nearby 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>healthcare facility with arrangements for quick transportation of workers in case of an emergency.</p> <ul style="list-style-type: none"> ▪ Persuade the workers to inform the authorities for their safety and of other if they observe any signs and symptoms in a colleague. ▪ Do not allow any worker at the construction site who has the symptoms ▪ Display the awareness banners about hand hygiene and physical distancing, where you can, around the work site. ▪ Everyone on the construction site must observe sneezing and coughing etiquettes. Workers shall be requested and required to wash their hands as frequently as practicable and shall also be advised not to touch their face with their hands during work. ▪ Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate personal gears and assets which must be clearly labelled and stored without intermixing. ▪ Only sanitizable dinning surfaces shall be used, which must be cleaned before each service. 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<ul style="list-style-type: none"> The lunch breaks and stretch breaks of the workers must be staggered to avoid the clustering of workers. Workers must not sit at less than 2 meters' distance while having meals and while any other activity requiring interpersonal communications. Adequate ventilation shall be provided in dining areas, resting places and sleeping areas. In the wake of current restrictions on transportations site managers will ensure safe transport arrangements for worker which shall not be crowded and shall have social distancing in place during the entire process from pickups till drops at destination. In case of workers sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms in a well ventilated area. A supply of safe drinking water must be made available at the project site and maintained. <p>Advice for Construction Workers:</p> <ul style="list-style-type: none"> All possible and prescribed measures shall be taken to ensure your and others health. Enter your contact details in the register maintained at the site, in case a follow up or tracing 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>and tracking of contacts is required at a later stage.</p> <ul style="list-style-type: none"> Follow hygiene practices at washrooms and shower facility with proper and adequate use of soaps and disinfectants. Every worker must change into standard working attire at the time of commencement of duty and change back to their regular dress after taking shower when their duty hours' end. In addition to all other internationally recognized safety precaution for construction workers and other staff, every individual must use face mask. Face mask shall be replaced as and when soiled or otherwise removed. Outer surface of face mask must not be touched with hands. Workers shall wash their hands as frequently as practicable and shall not to touch their face with their hands during work. Everyone on the construction site must observe sneezing and coughing etiquettes. Workers must maintain no less than two arm lengths between them before, during after work at all the times. They shall not make physical contact and shall be required to maintain separate 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>personal gears and assets which must be clearly labelled and stored without intermix.</p> <ul style="list-style-type: none"> ▪ Sick worker shall immediately inform the site manager and must get medical advice from nearby health Centre. ▪ Only sanitizable dining surfaces shall be used. ▪ Do not sit at less than 2 meters' distance while having meals and while any other activity requiring interpersonal communications. ▪ Do not use biometric attendance machines or crowd during attendance, entry or exit to the premises of the construction site. ▪ Use safe transport arrangements which shall not be crowded and shall have social distancing in place during the entire process from pickups till drops at destination. ▪ In case sleeping in at the site of construction, a safe distance of 2 meters must be ensured in the sleeping rooms in a well ventilated area <p>Deliveries or Other Contractors Visiting the Site:</p> <ul style="list-style-type: none"> ▪ Non-essential visits to the construction sites shall be cancelled or postponed. 	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<ul style="list-style-type: none"> ▪ Delivery workers or other contractors who need to visit the construction site must go through temperature check before entering and shall be given clear instructions for precautions to be taken while on site. ▪ Designate the workers, with protective gears or at least gloved and mask, to attend to the deliveries and contractors. ▪ Make alcohol-based hand sanitizer (at least 70%) available for the workers handling deliveries. ▪ Instruct the visiting truck drivers to remain in their vehicles and whenever possible make use of contactless methods, such as mobile phones, to communicate with your workers 	
Operational Phase				
1	Natural Hazard	To minimize the risk of structural collapse and flooding in park	<ul style="list-style-type: none"> ▪ Ensure that the new structures can withstand earthquake impacts; ▪ Inspections shall be conducted at appropriate intervals by qualified personnel to ensure integrity of structures; and ▪ Develop an emergency response plan for the rainwater flooding in park. 	PO

Sr. No.	Parameters	Target	Mitigation	Responsibility
2	Waste	To minimize and to store the solid waste	<ul style="list-style-type: none"> Proper waste management system including provision of waste bins, regular sweeping and collection of waste will be adopted during operational phase. 	PO
3	Drainage	To prevent flooding and pooling	<ul style="list-style-type: none"> Routine inspection and maintenance of the drainage system shall be scheduled and implemented. 	PO
4	Flora	To maintain flora in the park properly	<ul style="list-style-type: none"> Routine inspection will be carried out to check the maintenance of the park; Weeds will be monitored weekly and removed no less than every two weeks; Any tree that poses a concern to public safety will be immediately barricaded and evaluated by ecologist. Issues of immediate concern would be trees or branches that are leaning or broken that may fall onto an area of pedestrian or vehicular activity; Use of fertilizers should be strictly monitored in order to avoid any incident. Natural nutrients shall rather be preferred. 	PO
5.	Use of Pesticides	To avoid harmful impact of using pesticides	<ul style="list-style-type: none"> Make sure birds, pets and children are not near before mixing and applying pesticides. Select pesticides which are not much harmful for environment. Certain pesticides may cause injury to crops. Before application. take into account the 	PO

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>stage of plant development, the soil type, conditions, temperature, moisture etc.</p> <ul style="list-style-type: none"> ▪ Use PPEs while using pesticide. ▪ Mix pesticides in well ventilated areas and mix only the amount what is needed for immediate use. Apply only recommended dose and dilution. While spraying, avoid windy conditions. ▪ Dispose off empty containers carefully. Never reuse them. Make sure containers are not accessible to children or animals. ▪ Never eat, smoke, drink or chew while using pesticides. ▪ Emergency medical care in advance shall be arranged. ▪ Do not expose pesticides to sun light or rain water and do not transfer pesticides into other container and never store weedicides with other pesticides. ▪ Use right kind of equipment and avoid leaky defective equipment. ▪ Select right type of nozzle. 	
6	Health Hazard (Respiratory illness caused by COVID-19 Infection that may lead to fatality)	Avoid Spread of Corona Virus	<ul style="list-style-type: none"> ▪ Reporting employees who are showing symptoms such as fever or high body temperature, coughing, difficulty of breathing or chest pain. Sending them to clinic or nearest hospital immediately. ▪ Body temperature monitoring through Thermal Scanner or other devices to monitor the body temperature of each 	PO

Sr. No.	Parameters	Target	Mitigation	Responsibility
			<p>employee entering/leaving the site or at camp.</p> <ul style="list-style-type: none"> Awareness and implementation of Quarantine Procedure for all employees who came back from vacation. No Handshake Policy and ensure at least 1 meter distance at workplace. Conduct regular housekeeping and sanitation for all access/egress points as well as Log-in/Log-out devices. If possible, deactivate Log-in/Log-out devices such as biometrics. Conduct awareness on how to protect yourself against the infection of COVID-19 through campaign (posters, distribution of brochure). Communicating and implementing COVID-19 Guidelines Ensure Disinfection of offices and machinery periodically, temperature screening at project entrances, provision of hand sanitizers to office and labor staff, provision of surgical face masks, instruction boards and signage at different locations for COVID-19 awareness 	

DC Design Consultant
 CC Construction Contractor
 SC Supervision Consultant
 PO Park Operator

SECTION 5

ENVIRONMENTAL MONITORING

5.0 General

40. Environmental Monitoring is undertaken during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters are selected and quantitative & qualitative analyses are carried out. The results of analysis are compared with the guidelines; standards and pre-project condition to investigate whether the EMP and its implementation are effective for the mitigation of impacts or not.
41. Parameters to be analyzed during construction & operation of the project, responsibilities for monitoring & reporting and monitoring cost have been discussed in this section.

5.1 Environmental Monitoring during Pre-Construction Phase, Construction and Operation Phases

42. The respective monitoring to be conducted during the three project development phases is provided in **Tables 5.1 to 5.3** below.

5.3 Responsibilities for Monitoring and Reporting

43. The PMU will be responsible for environmental monitoring and reporting throughout the construction and operation phases. A monitoring report will be prepared on quarterly basis and one comprehensive report will be prepared on bi-annual basis for submission to ADB.

5.4 Cost of Environmental Monitoring

44. The **Table 5.4** below provides cost estimates for 'Pre-Construction phase' monitoring while **Tables 5.5** and **5.6** provides cost estimates for 'Construction phase' and 'Operation phase' monitoring of key environmental parameters.

Table-5.1: 'Pre-Construction' Monitoring Plan for Baseline Development

Parameter to be measured	Objective of Monitoring	Parameters to be Monitored	Measurements	Location*	Frequency	Responsibility
Ambient Air Quality	To establish baseline air quality levels	CO, NO ₂ , SO ₂ , O ₃ & PM ₁₀ (particulate matter smaller than 10 microns) concentration at receptor level	1-hr and 24-hr concentration levels	At three random receptor locations in the project area	Once	SC
Ambient Noise	To establish baseline noise levels	Ambient noise level near receptors in project area	A-weighted noise levels – 24 hours, readings taken at 15 s intervals over 15 min. every hour, and then averaged	At three random receptor locations in the project area	Once	SC
Groundwater Quality	To establish groundwater quality in project area	Groundwater quality in project area	Water samples for comparison against NEQS parameters	At two locations around the site in the project area	Once	SC
Surface water quality	To establish surface quality in project area	Surface water quality in project area	Water samples for comparison against NEQS parameters	At two locations around the site in the project area	Once	SC

* Monitoring Locations to be finalized jointly between PMU Safeguards staff and Supervision Consultant (SC).

Table-5.2: Construction Phase Monitoring Requirements

Project Activity and Potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Noise Disturbance due to noise from construction activity	To determine the effectiveness of noise abatement measures on sound pressure levels	Ambient noise level at different locations in project area	A-weighted noise levels – 24 hours, readings taken at 15 s intervals over 15 min. every hour at 15 m from receptors, and then averaged	At three random receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, SC
Air Quality Dust emissions from construction vehicles and equipment	To determine the effectiveness of dust control program on dust at receptor level	CO, NO ₂ , SO ₂ , O ₃ & PM ₁₀ (particulate matter smaller than 10 microns) concentration at receptor level	1-hr and 24-hr concentration levels	At three random receptor locations in project area	Quarterly basis on a typical working day	Contractor's Environmental officer, SC
		Visible dust	Visual observation of size of dust clouds, their dispersion and the direction of dispersion	Construction site	Once daily during peak construction period	Contractor's Environmental officer, SC
Groundwater Quality	To establish groundwater quality in project area	Groundwater quality in project area	Water samples for comparison against NEQS parameters	At two locations around the site in the project area	Quarterly	Contractor's Environmental officer, SC
Surface water Quality	To establish surface quality in project area	Surface water quality in project area	Water samples for comparison against NEQS parameters	At two locations around the site in the project area	Quarterly	Contractor's Environmental officer, SC

Project Activity and Potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Safety precautions by workers	To prevent accidents for workers and general public	Number of near miss events and accidents taking place	Visual inspections	Construction site	Once Daily	Contractor's Environmental officer, SC
Soil Contamination	To prevent contamination of soil from oil and toxic chemical spills and leakages	Incidents of oil and toxic chemical spills	Visual inspections	At construction site and at vehicle and machinery refuelling & maintenance areas	Once a month	Contractor's Environmental officer, SC
Solid Waste & Effluent disposal Insufficient procedures for waste collection, storage, transportation and disposal	To check the availability of waste management system and implementation	Inspection of solid and liquid effluent generation, collection, segregation, storage, recycling and disposal will be undertaken at all work sites in project area	Visual inspections	At work sites in project area	Once daily.	Contractor's Environmental officer, SC

* Monitoring Locations to be finalized jointly between PMU Safeguards staff and Supervision Consultant (SC).

Table-5.3: 'Operation Phase' Environmental Monitoring Plan

Parameter to be measured	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Solid Waste Management	To assess that solid waste generated from park operation is managed as per EMP requirements	All waste being generated is being managed and disposed off as per international good practices	Solid waste inventory audit	Park premises	Bi-Annual	Park Operator (PO)

Table 5.4: Annual Cost Estimates for 'Pre-Construction Phase' Environmental Monitoring¹

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Air Quality	CO, NO ₂ , SO ₂ , O ₃ PM ₁₀	3 (Once only at 3 locations)	90,000	3 readings @ PKR 30,000 per sample
Noise Levels	dB(A)	3 (Once only at 3 locations)	90,000	3 readings @ PKR 30,000 per reading
Ground Water Quality	NEQS	2 (Once only at 2 locations)	60,000	2 readings @ PKR 30,000 per sample

¹ For air quality monitoring: 'Passive samplers' such as test tubes can be used or 'Active samplers' with sorbent tubes can also be used.

²²For noise monitoring: sampling equipment with duration greater than 1 hour can be used.

Surface Water Quality	NEQS	2 (Once only at 2 locations)	60,000	2 readings @ PKR 30,000 per sample
Contingencies			15,000	5% of monitoring cost
Total (PKR)			315,000	

Table 5.5: Annual Cost Estimates for 'Construction Phase' Environmental Monitoring²

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Air Quality	CO, NO ₂ , SO ₂ , O ₃ PM ₁₀	12 (Quarterly basis at 3 locations)	360,000	12 readings @ PKR 30,000 per sample
Noise Levels	dB(A)	12 (Quarterly basis at 3 locations)	360,000	12 readings @ PKR 30,000 per reading
Ground Water Quality	NEQS	8 (Quarterly basis at 2 locations)	240,000	8 readings @ PKR 30,000 per sample
Surface Water Quality	NEQS	8 (Quarterly basis at 2 locations)	240,000	8 readings @ PKR 30,000 per sample
Contingencies			60,000	5% of monitoring cost

Total (PKR)	1,260,000
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Table 5.6: Annual Cost Estimates for 'Operation Phase' Environmental Monitoring³

Monitoring Component	Parameters	Quantity	Amount PKR	Details
Waste Management	Solid Waste	Bi-Annual	100,000	Twice @ PKR 50,000
Total (PKR)			100,000	

SECTION 6

ENVIRONMENTAL MITIGATION AND MONITORING COST

6.0 General

45. The cost required to effectively implement the mitigation measures is important for the sustainability of the Project, both in the construction and operational phases.
46. Cost for Environmental Monitoring of air, noise, drinking & wastewater is already given in the previous section. Other relevant cost for mitigation of adverse environmental impacts of the proposed project are summarized in **Table 6.1** below.

Table-6.1: Annual Environmental Mitigation Cost

Sr. No.	Activity	Basis	Cost (Rs.)
1	Medical screening for workers	Rs. 1200 per employee and for 100 employees	120,000
2	Material Storage, handling and use	Three (03) No. of tarpaulins of Rs. 20,000 each	60,000
3	Handling/ transportation of hazardous material	Rs. 12,000/month for a period of 12 months will be required for transportation of material	144,000
4	Handling of solid waste	Rs.10,000 per month (two trips per month) for a period of 12 months, which includes the cost of collection, transportation and disposal to the designated site	120,000
5	Cost of Personal Protective Equipment (PPE)*	For 100 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs	402,000
6	Cost of environmental training	Lump sum	200,000
7	Covid Management Cost	Lump sum	300,000
Grand Total			1,346,000

47. Detail of PPE cost is given in **Table 6.2** below.

Table-6.2: Break-up for Annual PPEs Cost

Items	Quantity	Cost / Item (Rs.)	Total Cost (Rs.)
Personal Protective Equipment PPE			
Dust masks	4800	20	96,000
Safety Shoes	200	1200	24,000
Gloves	1200	200	240,000
First Aid Box	3	2000	6,000
Ear Plugs	1200	30	36,000
Total			402,000
Time required for Construction = 12 months			
No. of labours required during construction = 100			
Detail of Personal Protective Equipment PPE			
Dust mask	1 dust mask to be used in a week by each laborer		
Safety Shoes	1 safety shoe for six months for each laborer		
Gloves	2 pair of gloves for each laborer for a month		
First Aid Box	1 first aid box at each work site		
Ear Plug	1 set of ear plug to be used for 1 month for each laborer		

ANNEXURE: A

REA Checklist

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

Pakistan/Khyber Pakhtunkhwa Cities Improvement Project (KPCIP)

Sector Division:

Green Urban Spaces - Recreational Park Bagh-e-Naran Extension

Screening Questions	Yes	No	Remarks
A. Project Sitting Is the project area?			
▪ Densely populated?		✓	The site is in a planned residential area, where houses are appropriately spaced.
▪ Heavy with development activities?		✓	The area is fairly developed. Construction of new residential units by individual plot owners takes place very sporadically. Any such construction activity in the area remains well regulated by authorities.
▪ Adjacent to or within any environmentally sensitive areas?		✓	No environmental sensitive area (national park/protected areas, estuarine etc) is present adjacent to, near or within the project area.
• Cultural heritage site		✓	No heritage site within or near the project area.
• Protected Area		✓	No protected area/s within or around the project site.
• Wetland		✓	No wetland located within or around the project site.
• Mangrove		✓	No mangroves within or around the project area.
• Estuarine		✓	No estuarine located within or around the project site.
• Buffer zone of protected area		✓	The project site does not occupy any buffer zones of protected areas.
• Special area for protecting biodiversity.		✓	The project site is not located in any special area for protecting biodiversity.
• Bay		✓	There is no bay on the site.
B. Potential Environmental Impacts Will the Project cause			
▪ Impacts on the sustainability of urban green spaces and their interactions with other urban services.		✓	The project aims to enhance urban green space and create recreational opportunities to the public and local communities. There will be negligible adverse impacts and project will cause more sustainability of the area.

Screening Questions	Yes	No	Remarks
▪ Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	The proposed project will improve the natural character of the area.
▪ Dislocation or involuntary resettlement of people?		✓	As the land is owned by Peshawar Development Authority, there will not be any dislocation or involuntary resettlement issues.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?		✓	No disproportionate impacts will be caused by this project. Residents in the immediate vicinity of site, residents of the surrounding area will all benefit equally from the project.
▪ Degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	No such risk as cultural properties are not located in or around the project area.
▪ Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	No such potential community impacts are anticipated relating to low-income, squatter groups or pollution risks to the surrounding population.
▪ Water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters)?		✓	No potential impacts are anticipated on water resources as existing water supply infrastructure shall serve adequately during construction and operation without the need to use additional groundwater sources.
▪ Air pollution due to urban emissions?		✓	No emissions, rather the project will serve as counter measure against emissions from surrounding areas.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?		✓	Negligible physical, chemical and biological hazards during project construction and operation are anticipated. Appropriate occupational health and safety practices will be implemented and training imparted to avoid any physical, chemical or biological hazards during construction.
▪ Road blocking and temporary flooding due to land excavation during rainy season?		✓	The short construction and development phase can be accommodated during appropriate season. No likelihood of road blocking or floods.
▪ Noise and dust from construction activities?	✓		Some noise and dust can be expected during strengthening of drain bank. This will easily be mitigated through best management practices such as the use of noise barriers and spraying water.
▪ Traffic disturbances due to construction material transport and wastes?		✓	By adopting best construction management techniques and practices, potential disturbances during construction will be minimized. Construction and development activity will be kept limited to within the project area and not onto adjacent roads or paths. Low-traffic hours will also be selected for the transportation of materials.
▪ Temporary silt runoff due to construction?		✓	The construction activity is not intense enough to cause any significant silt runoff. Best management practices will be adopted to minimize the runoff.
▪ Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Construction and operation phases will not cause pollution, thermal inversion, or smog.
▪ Water depletion and/or degradation?		✓	Minimal and efficient use of water will be made during construction and operation phases, thereby mitigating the issue of water depletion or degradation.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> Overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization? 		✓	Construction and operation phases will not make use of groundwater.
<ul style="list-style-type: none"> Contamination of surface and ground waters due to improper waste disposal? 		✓	Waste generation is not expected from the construction and development process. Waste during operation (public use of the park) will be collected by installing bins served by the city's waste management system.
<ul style="list-style-type: none"> Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems? 		✓	Pollution of water bodies will not happen during this project. For the protection measures of the site, gabion retaining wall is already made in the site premises.
<ul style="list-style-type: none"> Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		✓	The development process will be limited in spatial and temporal terms, and not likely to place any burden on existing social infrastructure or services. No migration will occur.
<ul style="list-style-type: none"> Social conflicts if workers from other regions or countries are hired? 		✓	To avoid social conflicts, the hiring of local laborers and construction firms will be given preference over the hiring of workers from other regions.
<ul style="list-style-type: none"> Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction? 		✓	No explosives, fuel, chemicals or other harmful substances are expected to be used during construction or operation
<ul style="list-style-type: none"> Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? 		✓	No considerable natural hazards are expected during the construction or operation phases. Structural components will be constructed according to the standards of natural hazard safety factors.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?	✓		The project area is situated along a stream. Potential for flood, although very low, does exist, and will be mitigated in the project design.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased extreme rainfall increases flooding, damaging proposed infrastructure)?		✓	The project is not expected to face problems caused due to extreme weather events. Extreme rainfall might test the water carrying capacity of the adjacent drain which the project aims to strengthen significantly from its already minimally vulnerable capacity.
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		✓	The project site is not vulnerable of socio-economic aspects and demographics as socioeconomic characteristics of the surrounding population do not vary too greatly to cause much stratification.
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by paving vulnerable groundwater recharge areas, or using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		✓	The project will not increase the climate or disaster vulnerability of the surrounding areas. Most of the park area will maintain its natural green cover and will not be a hindrance to GW recharge.

* Hazards are potentially damaging physical events.

PMU KPCIP Response:

Project fall in category: (A)_____(B)_____(C)_____✓_____(F)_____

ANNEXURE: B

WHO Guidance on Laboratory Biosafety related to COVID-19

Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19)

Interim guidance
12 February 2020



1. Introduction

The purpose of this document is to provide interim guidance on laboratory biosafety related to the testing of clinical specimens of patients that meet the case definition of the novel pathogen identified in Wuhan, China, that is, 2019 novel coronavirus (2019-nCoV), now known as the virus responsible for coronavirus disease 2019 (COVID-19).

As our understanding of COVID-19 is limited but rapidly growing, the World Health Organization (WHO) continues to monitor developments and will revise these recommendations as necessary.

Highlights of COVID-19 laboratory biosafety

- All procedures must be performed based on risk assessment and only by personnel with demonstrated capability, in strict observance of any relevant protocols at all times.
- Initial processing (before inactivation) of all specimens should take place in a validated biological safety cabinet (BSC) or primary containment device.
- Non-propagative diagnostic laboratory work (for example, sequencing, nucleic acid amplification test [NAAT]) should be conducted at a facility using procedures equivalent to Biosafety Level 2 (BSL-2)
- Propagative work (for example, virus culture, isolation or neutralization assays) should be conducted at a containment laboratory with inward directional airflow (BSL-3).
- Appropriate disinfectants with proven activity against enveloped viruses should be used (for example, hypochlorite [bleach], alcohol, hydrogen peroxide, quaternary ammonium compounds and phenolic compounds).
- Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A, UN2814, "infectious substance, affecting humans".

2. Laboratory biosafety

It is essential to ensure that health laboratories adhere to appropriate biosafety practices. Any testing for the presence of the virus responsible for COVID-19 or of clinical specimens from patients meeting the suspected case definition (1) should be performed in appropriately equipped laboratories, by staff trained in the relevant technical and safety procedures. National guidelines on the laboratory biosafety should be followed in all circumstances. For general information on laboratory biosafety guidelines, see the WHO *Laboratory biosafety manual*, 3rd edition (2) in the interim before the 4th edition is released.

Key points

- Each laboratory should conduct a local (that is, institutional) risk assessment to ensure it is competent to safely perform the intended testing with appropriate risk control measures in place.
- When handling and processing specimens, including blood for serological testing, laboratory practices and procedures that are basic to good microbiological practices and procedures (GMPP) should be followed.
- The handling and processing of specimens from cases with suspected or confirmed COVID-19 infection that are intended for additional laboratory tests, such as haematology or blood gas analysis, should follow local guidelines for processing potentially infectious material.
- Non-propagative diagnostic laboratory work, including sequencing and NAAT, on clinical specimens from patients who are suspected or confirmed to be infected with COVID-19, should be conducted adopting the practices and procedures of "core requirements",¹ as detailed in **Annex 1**, and an appropriate selection of "heightened control measures",² as informed by the local risk assessment. In the interim, BSL-2 in the WHO *Laboratory biosafety manual*, 3rd edition (2) remains appropriate until the 4th edition replaces it.
- Handling of material with high concentrations of live virus (such as when performing virus propagation, virus isolation or neutralization assays) or large volumes of infectious materials should be performed **only by**

¹ **Core requirements:** A set of minimum requirements defined in the 4th edition of the WHO *Laboratory biosafety manual* to describe a combination of risk control measures that are both the foundation for, and an integral part of, laboratory biosafety. These measures reflect international standards and best practice in biosafety that are necessary to work safely with biological agents, even where the associated risks are minimal.

² **Heightened control measures:** A set of risk control measures that may need to be applied in a laboratory facility because the outcome of a risk assessment indicates that the biological agents being handled and/or the activities to be performed with them are associated with a relatively high risk that cannot be acceptable solely with the core requirements.

properly trained and competent personnel in laboratories capable of meeting additional essential containment requirements and practices, that is, BSL-3.

- Initial processing (before inactivation) of all specimens, including those for sequencing and NAAT, should take place in an appropriately maintained and validated BSC or primary containment device.
- Appropriate disinfectants with proven activity against enveloped viruses should be used for the recommended contact time, at the correct dilution and within the expiry date after the working solution is prepared.
- All technical procedures should be performed in a way that minimizes the generation of aerosols and droplets.
- Appropriate personal protective equipment (PPE), as determined by a detailed risk assessment, should be worn by all laboratory personnel handling these specimens.
- Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A UN2814, "infectious substance, affecting humans" (3).

3. Recommendations addressing minimal/essential working conditions associated with specific manipulations in laboratory settings

The additional recommendations provided in this section address the minimal/essential working conditions associated with specific manipulations in laboratory settings.

a. Risk assessment

Risk assessment is a systematic process of gathering information and evaluating the likelihood and consequences of exposure to or release of workplace hazard(s) and determining the appropriate risk control measures to reduce the risk to an acceptable level. It is important to note that hazards alone do not pose a risk to humans or animals. Consideration therefore must also be given to the types of equipment used and the procedure(s) that will be performed with the biological agent.

It is highly recommended to start with performing a local risk assessment for each process step, that is, from sample collection, sample reception, clinical testing, polymerase chain reaction (PCR) to virus isolation (only when and where applicable). Certain hazards will then be considered for each process step, such as aerosol exposure during sample processing; eye splash during

sample processing; infectious culture material spill; and leaking sample (in the case of sample reception), with an assessed grade of risk. For each identified risk, appropriate risk control measures, including but not limited to the following recommendations, should be selected and implemented, in order to mitigate the residual risks to an acceptable level.

A risk assessment template is provided in **Annex 2**; this is intended to serve as an example and to facilitate the process.

b. Routine laboratory procedures, including non-propagative diagnostic work and PCR analysis

Non-culture-based diagnostic laboratory work, and PCR analysis on clinical specimens from patients who are suspected or confirmed to be infected with the virus responsible for COVID-19, should be conducted adopting practices and procedures described for conventional clinical and microbiology laboratories as described in the "core requirements" (see **Annex 1**).

However, all manipulations of potentially infectious materials, including those that may cause splashes, droplets or aerosols of infectious materials (for example, loading and unloading of sealed centrifuge cups, grinding, blending, vigorous shaking or mixing, sonic disruption, opening of containers of infectious materials whose internal pressure may be different from the ambient pressure), should be performed in appropriately maintained and validated BSCs or primary containment devices, by personnel with demonstrated capability.

Examples of routine laboratory procedures include:

- diagnostic testing of serum; blood (including haematology and clinical chemistry); respiratory specimens such as nasopharyngeal and oropharyngeal swabs, sputum and/or endotracheal aspirate or bronchoalveolar lavage; stool; or other specimens;
- routine examination of mycotic and bacterial cultures developed from respiratory tract specimens. When handling and processing specimens, "core requirements" (see **Annex 1**), including GMPP, should be followed at all times, including but not limited to those under the following subheadings. More details are explained and demonstrated in the WHO [Biosafety video series](#) (4).

c. Use of appropriate disinfectants

- While little is known about this novel virus, the comparable genetic characteristics between the virus responsible for COVID-19 and MERS-CoV suggest that the COVID-19 virus may be susceptible to disinfectants with proven activity against enveloped viruses, including sodium hypochlorite (bleach; for example, 1000 parts per million [ppm] (0.1%) for general surface disinfection and 10 000 ppm (1%) for disinfection of blood spills);

62–71% ethanol; 0.5% hydrogen peroxide; quaternary ammonium compounds; and phenolic compounds, if used according to the manufacturer's recommendations. Other biocidal agents such as 0.05–0.2% benzalkonium chloride or 0.02% chlorhexidine digluconate can be less effective.

- Particular attention should be paid not only to the selection of the disinfectant but also the contact time (for example, 10 minutes), dilution (that is, concentration of the active ingredient) and expiry date after the working solution is prepared.

- Human coronaviruses in general are known to persist on inanimate surfaces such as metal, glass or plastic for up to 9 days (5).

d. Viral isolation

Unless a country decides otherwise, considering the newly acquired knowledge and effective preventive measures described above, viral isolation on clinical specimens from patients who are suspected or confirmed to be infected with the virus responsible for COVID-19 should be performed only in laboratories capable of meeting the following additional containment criteria:

- a controlled ventilation system maintains inward directional airflow into the laboratory room;
- exhaust air from the laboratory room is not recirculated to other areas within the building. Air must be HEPA (high-efficiency particulate air) filtered, if reconditioned and recirculated within the laboratory. When exhaust air from the laboratory is discharged to the outdoors, it must be dispersed away from occupied buildings and air intakes. This air should be discharged through HEPA filters;
- a dedicated hand-wash sink is available in the laboratory;
- all manipulations of infectious or potentially infectious materials must be performed in appropriately maintained and validated BSCs;
- laboratory workers should wear protective equipment, including disposable gloves; solid-front or wrap-around gowns, scrub suits, or coveralls with sleeves that fully cover the forearms; head coverings; shoe covers or dedicated shoes; and eye protection (goggles or face shield). Risk assessment should inform the use of respiratory protection (fit-tested particulate respirator, for example, EU FFP2, US 6 NIOSH-certified N95 or equivalent, or higher protection);
- centrifugation of specimens should be performed using sealed centrifuge rotors or sample cups. These rotors or cups should be loaded and unloaded in a BSC.

e. Additional risks associated with virus isolation studies

Certain experimental procedures may carry additional risks of virus mutations with possible increased pathogenicity and/or transmissibility, or viruses with altered antigenicity or drug susceptibility. Specific risk assessments should be conducted, and specific risk-reduction measures adopted, before any of the following procedures are conducted:

- coinfection of cell cultures with different coronaviruses, or any procedures that may result in a coinfection;
- culture of viruses in the presence of antiviral drugs;
- deliberate genetic modification of viruses.

f. Work with animals infected with the virus responsible for COVID-19

The following activities require an animal facility – BSL-3 facilities and work practices, as detailed in the WHO *Laboratory biosafety manual*, 3rd edition (2):

- inoculation of animals for potential recovery of the agent from specimens of the virus responsible for COVID-19;
- any protocol involving animal inoculation for confirmation and/or characterization of putative agents of the COVID-19 virus.

g. Referral of specimens to laboratories with appropriate containment measures in place

Laboratories that are not able to meet the above biosafety recommendations should consider transferring specimens to national, regional or international referral laboratories with COVID-19-detection capacity that can meet the biosafety requirements.

4. Packaging and shipment

All materials transported within and between laboratories should be placed in a secondary container, to minimize the potential for breakage or a spill. An example includes transfer of materials from the BSC to an incubator and vice versa. Specimens leaving the BSC should be surface decontaminated. Detailed guidance is provided in the WHO *Biosafety video series* (4), in particular *Good microbiological practices and procedures (GMPP) 7: transport*.

Transport of specimens within national borders should comply with applicable national regulations. Cross-boundary transport of specimens of the virus responsible for COVID-19 should follow the United Nations model regulations, *Technical instructions for the safe transport of*

dangerous goods by air (Doc 9284) of the International Civil Aviation Organization (6), for airlifted transport, and any other applicable regulations depending on the mode of transport being used. More information may be found in the WHO *Guidance on regulations for the transport of infectious substances 2019-2020* (applicable as from 1 January 2019) (3). A summary on transport of infectious substances is available in *Technical instructions for the safe transport of dangerous goods by air (Doc 9284)* of the International Civil Aviation Organization (6).

7. Managing epidemics: key facts about deadly diseases. Geneva: World Health Organization; 2018 (<https://apps.who.int/iris/handle/10665/272442>, accessed 14 February 2020).

8. How to handrub? With alcohol-based formulation. How to handwash? With soap and water. Geneva: World Health Organization; 2006.

ANNEXURE: C

WHO advice on Use of Masks for the COVID-19 Virus

Advice on the use of masks in the context of COVID-19

Interim guidance

6 April 2020



Background

This document provides advice on the use of masks in communities, during home care, and in health care settings in areas that have reported cases of COVID-19. It is intended for individuals in the community, public health and infection prevention and control (IPC) professionals, health care managers, health care workers (HCWs), and community health workers. It will be revised as more data become available.

Current information suggests that the two main routes of transmission of the COVID-19 virus are respiratory droplets and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact (within 1 m) with someone who has respiratory symptoms (coughing, sneezing) is at risk of being exposed to potentially infective respiratory droplets. Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).¹

WHO has recently summarized reports of transmission of the COVID-19 virus and provided a brief overview of current evidence on transmission from symptomatic, pre-symptomatic, and asymptomatic^a people infected with COVID-19 (full details are provided in WHO COVID-19 Sitrep79).²

Current evidence suggests that most disease is transmitted by symptomatic laboratory confirmed cases. The incubation period for COVID-19, which is the time between exposure to the virus and symptom onset, is on average 5–6 days, but can be as long as 14 days. During this period, also known as the “pre-symptomatic” period, some infected persons can be contagious and therefore transmit the virus to others.^{3–8} In a small number of reports, pre-symptomatic transmission has been documented through contact tracing efforts and enhanced investigation of clusters of confirmed cases.^{3–8} This is supported by data suggesting that some people can test positive for COVID-19 from 1–3 days before they develop symptoms.^{9,10}

Thus, it is possible that people infected with COVID-19 could transmit the virus before symptoms develop. It is important to recognize that pre-symptomatic transmission still requires the virus to be spread via infectious droplets or through

touching contaminated surfaces. WHO regularly monitors all emerging evidence about this critical topic and will provide updates as more information becomes available.

In this document medical masks are defined as surgical or procedure masks that are flat or pleated (some are shaped like cups); they are affixed to the head with straps. They are tested according to a set of standardized test methods (ASTM F2100, EN 14683, or equivalent) that aim to balance high filtration, adequate breathability and optionally, fluid penetration resistance. This document does not focus on respirators; for guidance on use of respirators see IPC guidance during health care when COVID-19 infection is suspected.¹¹

Wearing a medical mask is one of the prevention measures that can limit the spread of certain respiratory viral diseases, including COVID-19. **However, the use of a mask alone is insufficient to provide an adequate level of protection, and other measures should also be adopted.** Whether or not masks are used, maximum compliance with hand hygiene and other IPC measures is critical to prevent human-to-human transmission of COVID-19. WHO has developed guidance on IPC strategies for home care¹² and health care settings¹¹ for use when COVID-19 is suspected.

Community settings

Studies of influenza, influenza-like illness, and human coronaviruses provide evidence that the use of a medical mask can prevent the spread of infectious droplets from an infected person to someone else and potential contamination of the environment by these droplets.¹³ There is limited evidence that wearing a medical mask by healthy individuals in the households or among contacts of a sick patient, or among attendees of mass gatherings may be beneficial as a preventive measure.^{14–23} However, there is currently no evidence that wearing a mask (whether medical or other types) by healthy persons in the wider community setting, including universal community masking, can prevent them from infection with respiratory viruses, including COVID-19.

Medical masks should be reserved for health care workers.

The use of medical masks in the community may create a false sense of security, with neglect of other essential measures, such as hand hygiene practices and physical distancing, and may lead to touching the face under the masks and under the eyes, result in unnecessary costs, and take

^a An asymptomatic laboratory-confirmed case is a person infected with COVID-19 who does not develop symptoms. Asymptomatic transmission refers to transmission of the virus from a person, who does not develop

symptoms. The true extent of asymptomatic infections will be determined from serologic studies.

masks away from those in health care who need them most, especially when masks are in short supply.

Persons with symptoms should:

- wear a medical mask, self-isolate, and seek medical advice as soon as they start to feel unwell. Symptoms can include fever, fatigue, cough, sore throat, and difficulty breathing. It is important to note that early symptoms for

4. **Setting** in which the population lives in terms of population density, the ability to carry out physical distancing (e.g. on a crowded bus), and risk of rapid spread (e.g. closed settings, slums, camps/camp-like settings).
5. **Feasibility**: availability and costs of the mask, and

In the interim, decision makers may be moving ahead with advising the use of nonmedical masks. Where this is the case, the following features related to nonmedical masks should be taken into consideration:

- Numbers of layers of fabric/tissue
- Breathability of material used
- Water repellence/hydrophobic qualities
- Shape of mask
- Fit of mask

Home care

For COVID-19 patients with mild illness, hospitalization may not be required. All patients cared for outside hospital (i.e. at home or non-traditional settings) should be instructed to follow local/regional public health protocols for home isolation and return to designated COVID-19 hospital if they develop any worsening of illness.⁷

Home care may also be considered when inpatient care is unavailable or unsafe (e.g. capacity is limited, and resources are unable to meet the demand for health care services). Specific IPC guidance for home care should be followed.³

Persons with suspected COVID-19 or mild symptoms should:

- Self-isolate if isolation in a medical facility is not indicated or not possible
- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 m from other people;
- Wear a medical mask as much as possible; the mask should be changed at least once daily. Persons who cannot tolerate a medical mask should rigorously apply respiratory hygiene (i.e. cover mouth and nose with a disposable paper tissue when coughing or sneezing and dispose of it immediately after use or use a bent elbow procedure and then perform hand hygiene.)
- Avoid contaminating surfaces with saliva, phlegm, or respiratory secretions.
- Improve airflow and ventilation in their living space by opening windows and doors as much as possible.

Caregivers or those sharing living space with persons suspected of COVID-19 or with mild symptoms should:

- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 meter from the affected person when possible;
- Wear a medical mask when in the same room as the affected person;
- Dispose of any material contaminated with respiratory secretions (disposable tissues) immediately after use and then perform hand hygiene.
- Improve airflow and ventilation in the living space by opening windows as much as possible.

Health care settings

WHO provides guidance for the use of PPE, including masks, by health care workers in the guidance document: Rational use of PPE in the context of COVID-19.²⁴ Here we provide advice for people visiting a health care setting:

Symptomatic people visiting a health care setting should:

- Wear a medical mask while waiting in triage or other areas and during transportation within the facility;
- Not wear a medical mask when isolated in a single room, but cover their mouth and nose when coughing or sneezing with disposable paper tissues. Tissues must be disposed of appropriately, and hand hygiene should be performed immediately afterwards.

Health care workers should:

- Wear a medical mask when entering a room where patients with suspected or confirmed COVID-19 are admitted.
- Use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health-certified N95, European Union standard FFP2, or equivalent, when performing or working in settings where aerosol-generating procedures, such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy are performed.
- Full infection prevention and control guidance for health care workers is provided [here](#).

One study that evaluated the use of cloth masks in a health care facility found that health care workers using cotton cloth masks were at increased risk of infection compared with those who wore medical masks.²⁵ Therefore, cotton cloth masks are not considered appropriate for health care workers. As for other PPE items, if production of cloth masks for use in health care settings is proposed locally in situations of shortage or stock out, a local authority should assess the proposed PPE according to specific minimum standards and technical specifications.

Mask management

For any type of mask, appropriate use and disposal are essential to ensure that they are effective and to avoid any increase in transmission.

The following information on the correct use of masks is derived from practices in health care settings:

- Place the mask carefully, ensuring it covers the mouth and nose, and tie it securely to minimize any gaps between the face and the mask.
- Avoid touching the mask while wearing it.
- Remove the mask using the appropriate technique: do not touch the front of the mask but untie it from behind.
- After removal or whenever a used mask is inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty.
- Replace masks as soon as they become damp with a new clean, dry mask.
- Do not re-use single-use masks.
- Discard single-use masks after each use and dispose of them immediately upon removal.

¹ WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

12. World Health Organization. [Home care for patients with COVID-19 presenting with mild symptoms and management of contacts: interim guidance](#) (accessed 29 January 2020)

13. Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care. Geneva: World Health Organization: 2014