

Environmental Management Plan

Table-1: Pre-Construction Phase Environmental Management Plan

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Lack of sufficient planning to assure long term sustainability of the improvements and ensure protection of the assets created.	Design has included provisions for ensuring effective maintenance and protection of the assets to be created so as to ensure the long term sustainability. The long term sustainability has been ensured by taking into consideration appropriate Bureau of Indian Standards Codes (BIS) for design, Seismic Zone V coefficient, appropriate wind load factor (corresponding to 39 m/s wind speed), and detailed design after carrying geotechnical investigations and topographic survey.	Verification of design parameters	PWD	PMU and PMC	Review after completion of DPR	Part of PWD and PMC Professional Fee
2	Layout of components to avoid impacts on the aesthetics of the sites	Locating sub-projects components at all the three sites will avoid impacts on the aesthetics and surroundings and CLC and RLC buildings will very well mix with local buildings. The exterior designs of CLC and RLCs take care of this issue.	CLC and RLCs building's exteriors	PIUs and PWD	PMU and PMC	Review after completion of detailed design	Part of PWD and PMC Professional Fee
3	Slope stability related issues	The plot areas for CLC and RLC buildings at all the three locations are flat,	Slope protection measures on	PIU and PWD	PMU and PMC	Review of recommended slope	Part of PWD and PMC Professional

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		however, during construction any exposed slopes at excavated areas will be covered and slope protection measures will be provided specially at side slopes of internal roads.	side slopes of access path, internal roads, etc.			protection measures	Fee
4	Increased storm water runoff from alterations of the site's natural drainage patterns due to landscaping, excavation works, construction of parking lot, and addition of paved surfaces	Design of proposed CLC (at Nahan) and RLCs (at Chopal and Pragati Nagar) buildings enables efficient drainage of the plot and maintains natural drainage patterns. The storm water generated will be diverted to local drains through a properly constructed drainage system. Since all the three sites are in hilly regions, therefore, there is swift flow and drainage is not an issue.	Arrangement for proper diversion of storm water runoff	PIU and PWD	PMU and PMC	After mobilization of contractor (s) at the respective sites and during establishment of construction camps at sites	Incidental to construction cost
5	Integration of energy efficiency and energy conservation programs in design of sub-projects components	The detailed designs for the sub-projects have ensured that environmental sustainability principles, including energy efficiency, resource recycling, waste minimization, etc. The design considers the following energy efficiency measures: <ul style="list-style-type: none"> • Usage of recyclable materials like wood 	Specifications of rain water harvesting structures, electrical fixtures, details of water heating system	PIUs and PWD	PMU and PMC	During finalization of detailed design	Part of project cost

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		substitutes. <ul style="list-style-type: none"> • Installation of BEE certified equipment • Usage of energy efficient lighting fixtures (LED) • Provision of P-V cells on roof for solar power. 					
6	Consents, permits, clearances, no objection certificate (NOC), etc.	Obtain all necessary consents, permits, clearances, NOCs, etc. prior to start of civil works. Acknowledge in writing and provide report on compliance all obtained consents, permits, clearances, NOCs, etc.	Consents, permits, clearance and NOCs Records and communications	PIU	PMU	check consent for establishment of construction camps at respective sites , approval from civic authorities for CLC and RLCs construction at all three locations	Project cost
7	Establishment of baseline environmental conditions prior to start of civil works	Conduct documentation of location of components, areas for construction zone (Camp, staging, storage, stockpiling, etc.) and surroundings (within direct impact zones). Include photos and GPS coordinates	Records and Photographs	Contractor(s)	PIU and PWD	Once prior to start of construction works	Contractor(s)
8	Utilities	1. The locations and operators of utilities to be impacted should be identified and documented in detailed	List and maps showing utilities to be shifted Contingency	<ul style="list-style-type: none"> • PWD will prepare preliminary list and maps of utilities to 	PIUs and PWD	Pre-Construction Phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		<p>design documents to prevent unnecessary disruption of services during the construction phase.</p> <p>2. Require contractor(s) to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.</p> <p>3. Obtain from the PIUs and/or PWD the list of affected utilities and operators;</p> <p>4. If relocations are necessary; contractor will coordinate with the providers to relocate the utility.</p>	plan for services disruption	<p>be shifted</p> <ul style="list-style-type: none"> During detailed design phase, contractor to (i) prepare list and operators of utilities to be shifted; (ii) contingency plan 			
9	Social and Cultural Resources	<p>1. Consult Archaeological Survey of India (ASI) or Himachal Pradesh State Archaeology Department to obtain an expert assessment of the archaeological potential of sites.</p> <p>2. Consider alternatives, if the sites, are found to be of medium or high risk. Include state and local archaeological, cultural and historical authorities, and interest groups in</p>	Chance find protocol	<ul style="list-style-type: none"> PMC to consult ASI or HP State Archaeology Department PMC to develop protocol for chance finds 	PMU	Prior to start of construction activities	PMC

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		consultation forums as project stakeholders so that their expertise can be made available. 3. Develop a protocol for use by the contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved.					
10	Construction Camps - Locations, Selection, Design and Layout	Sitting of the construction Camps, at the respective sub- project sites, shall be as per the guidelines below and details of layout to be approved by PWD. The potential sites at the respective sub-project locations will be selected for labor camps and these shall be visited by the environmental expert of PMU safeguards cell along with environmental expert of PWD and one having least impacts on environment will be approved by the PWD and PMU. As far as possible, construction camps will be established at vacant land	Construction Camp sites, and locations of material storage areas, sanitation facilities	Contractor(s)	PWD and PIU	At the time of construction camps establishment and finalization of storage areas	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		<p>near the CLC and RLC plots to avoid impact on other land.</p> <p>Locations for storage of construction materials shall be identified at the respective plots of the sites or at any suitable buildings close to sub-project sites.</p> <p>Sanitation facilities at construction camps shall be adequately planned.</p>					
11	Sources of construction materials	<p>Use quarry sites and sources licensed by the GOHP.</p> <p>Verify suitability of all material sources and obtain approvals from PIUs.</p> <p>If additional quarries are required after construction has started, obtain written approval from PIU. Submit to PWD on a monthly basis documentation of sources of materials.</p>	Permits issued to quarries and sources of materials	<p>Contractor(s)</p> <p>PMC and PWD to verify sources (including permits) if additional is requested by contractor(s)</p>	PMU and PIU	Upon submission by contractor(s)	PMC and PWD as part of consultancy fee
12	Access for Construction material transportation	Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of sub-project sites.	Traffic management plan	Contractor(s)	PIU and PWD	During Delivery of construction materials	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		<p>Schedule transport and hauling activities during non-peak hours.</p> <p>Locate entry and exit points in areas where there is low potential for traffic congestion.</p> <p>Keep the sites free from all unnecessary obstructions.</p> <p>Drive vehicles in a considerate manner. Coordinate with the Traffic Police Department for temporary road diversions and for provision of traffic aids if transportation activities cannot be avoided during peak hours.</p>					
13	Occupational health and safety	<p>Comply with IFC EHS Guidelines on Occupational Health and Safety.</p> <p>Develop comprehensive site-specific health and safety (H&S) plans. The overall objective is to provide guidance to contractor(s) on establishing a management strategy and applying practices that are</p>	Health and safety (H&S) plan	Contractor(s)	PMU and PMC, PIU and PWD	During construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		<p>intended to eliminate, or reduce, fatalities, injuries and illnesses for workers performing activities and tasks associated with the project.</p> <p>Include in H&S plan measures such as: (i) type of hazards at CLC and RLCs construction sites; (ii) corresponding personal protective equipment for each identified hazard; (iii) H&S training for all site personnel; (iv) procedures to be followed for all site activities; and (v) documentation of work-related accidents.</p> <p>Provide medical insurance coverage for workers.</p>					
14	Stakeholder consultations	Continue information dissemination, stakeholder consultations, and involvement/participation of stakeholders during project implementation.	<p>-Disclosure records</p> <p>- Consultations</p>	PMU,PMC PIU,PWD and Contractor(s)	PMU and PMC	<ul style="list-style-type: none"> • During updating of IEE Report • During preparation of site- and activity-specific plans as per EMP • Prior to start of 	PMU and Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameters (Indicators for Compliance)	Responsible for Implementation	Responsible for Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
						<ul style="list-style-type: none"> construction • During construction 	

Table 12: Construction Phase Environmental Management Plan

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
1	Sanitation and drinking water facilities at construction Camps of sub-projects	The contractor(s) shall provide sanitation facilities at the respective camp sites of all the three sub-projects. These facilities will include dust bins in adequate numbers for solid waste collection, drinking water facilities, and separate toilets for male and females. These toilets facilities shall be maintained and septic tanks/soak pits shall be provided at the toilets. The dust bins shall be regularly emptied and waste from camp site shall be disposed off at designated	Construction camp sanitation and drinking water facilities	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		locations.					
2	Traffic Circulation plan during construction phase	Prior to commencement of site activities and mobilization on ground ,the Contractor(s) will prepare and get approved from the Engineer (PWD),circulation plan during construction for safe passage of public vehicles so that locals are not at inconvenience. The Contractor(s) with support of the PIU will carry out dissemination of these information and circulation plan at sites and at key access roads to the sub-project sites.	Safe movement of Traffic	Contractor	PWD and PIU	Every day during construction phase	Contractor(s)
3	Site clearance activities, including delineation of construction areas	Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from the Environmental Experts of PWD and PMC. All areas used for temporary construction operations will be subjected to complete restoration to their former conditions with appropriate rehabilitation procedures. The photographic records	Pre-construction records of sites and vegetation in area of construction	Contractor(s)	PWD and PIU	Duration of site preparation	PWD and PIU

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		shall be maintained for the temporary sites used for construction. These will help in proper restoration.					
4	Drinking water availability at Construction camp and construction sites	Sufficient supply of cold potable water to be provided and maintained. If the drinking water is obtained from an intermittent public water supply then storage tanks will be provided. For this contractor(s) will submit plans how availability of drinking water shall be assured. In case it is obtained from the natural spring then permission from local authorities shall be obtained.	Water supply source and availability of water , permission of local authority if obtained from local spring	Contractor(s)	PWD and PIU	During Construction phase regularly	Contractor(s)
5	Waste disposal	The pre-identified disposal location shall be part of Comprehensive Waste Disposal Plan. Solid Waste Management Plan to be prepared by the Contractor(s) in consultation with local civic authorities. The Environmental Specialist of PWD shall approve these disposal sites after conducting a joint inspection on the site with the Contractor(s).	Waste Disposal sites, waste management plan	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		Contractor shall ensure that waste shall not be disposed off near natural streams in the surroundings of site and along the access path.					
6	Stockpiling of construction materials	Stockpiling of construction materials will be done in such a way that it does not impact and obstructs the drainage. The stockpiles will be covered to protect from dust and erosion.	Stockpiling sites at sub-projects	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor(s)
7	Arrangement for Construction Water	(i) The Contractor(s) shall provide a list of locations and type of sources from where water for construction shall be acquired. (ii)The contractor shall use ground/surface water as a source of water for the construction with the written consent from the concerned Department. (iii)To avoid disruption/ disturbance to other water users, the Contractor shall arrange water from market or from local municipality and consult PWD before finalizing the source.	Water availability at identified water source locations	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor(s)
8	Soil Erosion	Slope protection measures will be undertaken as per design to control soil	Locations of slope protection	Contractor(s)	PIU and PWD		Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		erosion especially on side slopes of access and internal roads. Side slopes protection shall specifically be taken care at Chopal RLC site as this site is undulating.					
9	Water Pollution from Construction Wastes	The Contractor(s) shall take all precautionary measures to prevent entering of wastewater into any local stream during construction.	Sub-project sites	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)
10	Water Pollution from Fuel and Lubricants	The Contractor(s) shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located at least 500 m away from the natural streams. Contractor(s) shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground. Waste water from vehicle parking, fuel storage	Vehicle parking, refueling sites, Oil interceptor functioning	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		areas, workshops, wash down and refueling areas shall be treated in an oil interceptor before discharging it on land or into surface water bodies or into other treatment system.					
11	Soil Pollution due to fuel and lubricants, construction wastes	The fuel storage and vehicle cleaning area will be stationed such that spillage of fuels and lubricants does not contaminate the ground. Soil and pollution parameters will be monitored as per monitoring plan.	Vehicle maintenance and parking area, soil quality monitoring results	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)
12	Siltation of water bodies due to spillage of construction wastes	No disposal of construction wastes will be carried out into the surface water bodies. Extraneous construction wastes will be transported to the pre-identified disposal sites for safe disposal.	Water bodies specially natural streams near sub project sites	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)
13	Generation of dust	The contractor(s) will take every precaution to reduce the levels of dust at construction sites. All filling works to be protected/ covered in a manner to minimize dust generation.	Sub-project sites, air quality monitoring results	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
14	Emission from Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery used for construction shall conform to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to. The silent/quiet equipment available in the market shall be used in the sub-projects. The Contractor(s) shall maintain a record of PUC for all vehicles and machinery used during the contract period which shall be produced for verification whenever required.	PUC certificates of vehicles and machinery	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor
15	Noise Pollution	The Contractor(s) shall confirm that all Construction equipment used in construction shall strictly conform to the MoEFCC and CPCB noise standards and all vehicles and equipment used in construction shall be fitted with exhaust silencers. At the construction sites noisy construction work such as crushing,	Certificates of vehicles conforming noise standards, noise monitoring results	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		operation of DG sets, use of high noise generation equipment shall be stopped during the night time between 10.00 pm to 6.00 am. Noise limits for construction equipment used in this project will not exceed 75 dB (A).					
16	Impacts on flora and fauna	Minimize impacts on flora and fauna during construction phase by limiting site clearance bare minimum and limiting all types of pollution generation	Environmental monitoring reports, Trees and shrubs planted at sub-project sites	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor(s)
17	Material Handling at Sub-Project sites	Workers employed on mixing cement, lime mortars, concrete, etc., will be provided with protective footwear and protective goggles. Workers, who are engaged in welding works, will be provided with welder's protective eye-shields. The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions. The PWD will	Data on available personal protective equipment	Contractor(s)	PWD and PIU	Regularly during construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		be given at least 6 working days' notice of the proposed use of any chemical. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the Contractor(s).					
18	Disposal of Construction Waste, Debris and surplus cut	The Contractor(s) shall confirm that safe disposal of the construction waste will be ensured in the pre-identified disposal locations. In no case, any construction waste will be disposed of around the sub-project sites indiscriminately.	Disposal sites	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)
19	Safety Measures During Construction	Adequate safety measures for workers during handling of materials at sub-project sites will be taken up. The contractor(s) has to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger of the workers from accidental injuries, fire, etc. First aid treatment will be made available for all injuries likely to be sustained during the course of work. The contractor(s) will	Records of availability of personal protective equipment, availability of first aid kits	Contractor(s)	PIU and PWD	Regularly during construction phase	Contractor(s)

Sl. No.	Environmental Issues	Mitigation Measures	Parameter (Indicators for Compliance)	Responsible Implementation	Responsible Supervision	Frequency for Monitoring	Sources of Fund for Implementing Mitigation Measure
		conform to all anti-malaria instructions given to him by the Engineer.					
20	Clearing of Construction of Camp and Restoration	Contractor(s) to prepare site restoration plans for approval by the Engineer (PWD). The plan is to be implemented by the contractor(s) prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the PWD	Restoration plan, and records of pre-construction of temporary sites	Contractor(s)	PIU and PWD	End of construction phase	Contractor(s)

Table 3: Monitoring Plan for Sub-Projects (CLC at Nahan, and RLCs at Pragati Nagar and Chopal) in Shimla Zone Construction Package for Preconstruction and Construction Phases

Sl. No.	Field (Environmental Attribute)	Phase	Parameters to be Monitored	Locations	Frequency	Responsibility	Cost (INR/US\$)
1	Air Quality	During pre-construction phase	CO, NOx, PM ₁₀ , PM _{2.5} , and SO ₂	CLC construction site at Nahan, RLC construction sites at Pragati	Once in the pre-construction phase to establish baseline	Contractor(s), PWD, PMU, DORD (for RLCs at Nahan and Pragati Nagar) and	INR390,000/ US \$ 6000
		During Construction Phase			Once in every three months (except monsoon season)		

Sl. No.	Field (Environmental Attribute)	Phase	Parameters to be Monitored	Locations	Frequency	Responsibility	Cost (INR/US\$)
				Nagar and Chopal	during construction phase (24 months construction phase) Once in season except monsoon season for initial 2 years	DOUD(for CLC Nahan) through approved Monitoring Agency	
2	Water quality	During pre-construction phase	TDS, TSS, pH, Hardness, BOD, Faecal Coli form	Ground water close to CLC and RLCs construction sites	Once in pre-construction phase to establish baseline	Contractor(s), PWD, PMU, DORD (for RLCs at Nahan and Pragati Nagar) and DOUD(for CLC Nahan) through approved Monitoring Agency	INR390,000/ US \$6000
		During Construction Phase			Once in every three months (except monsoon season) during construction phase		
					Once in season except monsoon season for initial 2 years		
3	Noise Levels	During pre-construction phase	Noise quality as per National Ambient Noise Standards on dB(A) scale	Noise levels at CLC and RLC construction sites	Once in pre-Construction phase to establish baseline	Contractor(s), PWD, PMU, DORD (for RLCs at Nahan and Pragati Nagar) and DOUD(for CLC Nahan) through approved Monitoring Agency	INR 117,000/ US \$ 1800
		During Construction Phase			Once in every three months (except monsoon season) during construction phase		
					Once in season except monsoon season for initial 2 years		