

**Land Records Management & Information Systems (LRMIS)
Project**

Environmental Management Plan

May 2012



**Board of Revenue
Government of the Punjab**

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Executive Summary

1.

The Board of Revenue, under LRMIS Project, is constructing 80 new small-scale service center buildings of 4,500 sqft average area across the Punjab Province. The construction activities under this project do not fall under any of the Schedule-I or Schedule-II of the EIA Regulations 2000, which define the categories of projects requiring IEEs and EIAs to be carried out. However, World Bank's Operational Policy on Environmental Assessment is triggered and therefore this Environmental Management Plan has been prepared.

The building designs comply with the Building Codes of Pakistan (BCP) 2007, Uniform Building Code (UBC) 1997, and Earthquake Reconstruction & Rehabilitation Authority (ERRA) Interim Guidelines.

The environmental impacts are localized, low intensity, and temporary in nature which could be avoided or mitigated. All the building contractors, where construction is already underway, have been provided with a copy of environmental screening & monitoring checklists to make arrangements for necessary compliance with the proposed mitigation measures.

The LRMIS Project Director will be overall responsible for the EMP implementation. The LRMIS Procurement Specialist (Civil Works) will be designated as the LRMIS Environmental Coordinator (EC), who will ensure that the present EMP is effectively implemented. The EC will ensure that the Environmental Screening Checklist is provided to each of the construction contractors and the Supervision Consultants. S/he will hold meetings with the contractors, if needed, to facilitate implementation of the mitigation measures provided in the Checklist.

Environmental monitoring will be carried out with the help of the Environmental Monitoring Checklist. The monitoring will be carried out by the Resident Engineer (RE) of the Supervision Consultants, during his/her regular site visits. The filled Environmental Screening Checklist of each site will be used as the basis of the environmental monitoring.

The EC will also ensure that the environmental monitoring is carried out regularly during the entire construction phase. The filled Environmental Monitoring Checklist after each monitoring visit will be sent to the EC, who will maintain complete record of these Checklists. S/he will also prepare a quarterly report on the basis of the filled checklists, summarizing the salient information and outcome of the environmental monitoring of each construction site. These quarterly reports will be provided to the LRMIS Project Director, and will also be shared with the World Bank.

Environmental Management Plan

2. Introduction

The Board of Revenue, Punjab is undertaking the World Bank-financed **Land Records Management & Information Systems (LRMIS) Project**. The project also includes, among other activities, construction of new small-scale buildings in different parts of the province. Since these construction activities can potentially cause negative environmental impacts, a rapid environmental assessment has been carried out, and the present Environmental Management Plan (EMP) has been prepared, in accordance with the World Bank's safeguard policies.

3. EMP Objectives

The present EMP has been developed to provide streamlined and user-friendly environmental management procedure for small-scale building construction works, which are being carried out/planned under the LRMIS Project. The EMP provides 'good practice' mitigation measures to address localized - low to medium intensity environmental impacts - which are generally encountered during such construction works.

The specific objectives of the present EMP are:

- **Identify Impacts:** to identify likely impacts of the construction activities under the LRMIS Project on the environment of the area,
- **Mitigation Measures:** to propose appropriate mitigation measures that should be incorporated in the design of the project and/or implemented during the construction activities, to minimize if not eliminate the adverse impacts,
- **Monitoring Mechanism:** to propose environmental monitoring mechanism to ensure that the mitigation measures are implemented during the project execution, and
- **Implementation:** to propose institutional arrangements required to implement the EMP.

4. Construction Activities under LRMIS Project

4.1 Construction Methodology

The construction activities follow the standard methodology. At the outset of the project, architectural and civil construction design for each site is prepared. Once the design and drawings are available, contracting is carried out for each individual site.

The first construction activity is leveling and grading the site in accordance with the construction drawings. This is followed by excavation and foundations. Subsequent to this, superstructure is constructed, consisting of RCC columns, walls, roof slabs, and stairs. Simultaneous to this, plumbing and wiring activities are also started. Once the superstructure is completed, the finishing works are commenced, including plastering, flooring, fixing of doors and windows, wood works, installation of toilet fixtures, and finally, painting and polishing of walls, doors, windows and others. The above-described construction activities at each site are expected to take about 12-14 months.

Most of the construction works is carried out manually, with minimal usage of machinery. The exceptions are excavation for building foundations, for which excavators are used, small portable concrete mixers, which are used to prepare cement concrete mix at the site for all concrete works at the construction sites (RCC columns, and roof slabs), and small elevators to lift construction material to the upper floors. In addition, a small diesel generator is arranged at sites where electricity connection is not available.

4.2 Construction Personnel

Each construction site typically has a supervisor, and about 10-15 construction workers, including masons, carpenters, steel fixers, electricians, plumbers, un-skilled laborers, watchmen, and others.

4.3 Construction Materials

The construction material required at each site includes sand, cement, bricks, stone aggregate, steel, paints, floor tiles, bathroom fixtures and other accessories, lighting fixtures, doors, windows, glass panes, kitchen fixtures, and other similar items. Most of these materials is procured locally, and transported to the individual sites on trucks and dumpers.

The components of LMRIS Project that may have any environmental concerns are limited to the small-scale construction of Data Service Center facilities for the general public in different parts of the Province. These service center buildings are being constructed on government-owned lands in districts and tehsils of the Province.

4.4 Details of the Buildings

The construction activities are divided into phases as tabulated below:

1. Package-1 (7 Buildings), Pilot Project
2. Package-2 (30 Buildings)
3. Package-3 (43 Buildings)



PACKAGE-1 (7 BUILDINGS), PILOT PROJECT

Lot #	Districts	District/Tehsil	Area (sq. ft.)	No. of Stories
1	Lahore	1. Lahore City	6026	Double
		2. Lahore Cantt	5145	Double
2	Hafizabad	3. Hafizabad	4130	Single
		4. Pindi Bhattian	3842	Single
3	Lodhran	5. Lodhran	4130	Single
		6. Kahrora Pakka	4252	Double
		7. Duniyapur	3842	Single

PACKAGE-2 (30 BUILDINGS)

Lot #	Districts	District/Tehsil	Area (Sq. ft.)	No. of Stories
1	Rawalpindi	1. Rawalpindi	5848	Double
		2. Taxila	3952	Double
		3. Kahuta	3856	Single
		4. Murree	3856 / 4298	Single / Double
		5. Gujar Khan	3952	Double
	Chakwal	6. Chakwal	4130	Single
		7. Talagang	3856	Single
		8. Choa Saidan Shah	4298	Double
		9. Kallar Kahar	3856 / 4298	Single / Double
	Attock	10. Attock	4130	Single
		11. Hassanabdal	3856 / 4298	Single / Double
		12. Fateh Jang	3856	Single
		13. Jand	3856	Single

	Jhelum	14. Jhelum	5848	Double
		15. Sohawa	3856	Single
		16. Pind Dadan Khan	3856	Single
		17. Dina	3856	Single
2	Mandi Bahauddin	18. Mandi Bahauddin	4130	Single
		19. Malikwal	3856	Single
		20. Phalia	3856	Single
	Gujranwala	21. Gujranwala City	5848	Double
		22. Gujranwala Saddar	4298	Double
		23. Wazirabad	3856	Single
	Sialkot	24. Sialkot	4130	Single
		25. Daska	3856	Single
		26. Pasrur	4298	Double
		27. Sambrial	4298	Double
	Narowal	28. Narowal	4298	Double
		29. Shakargarh	3856	Single
		30. Zafarwal	3856	Single

PACKAGE-3 (43 BUILDINGS)

Lot #	Districts	District/Tehsil	Area (Sq. ft.)	No. of Stories
1	Sargodha	1. Sargodha	5848	Double
		2. Sillanwali	1550	Single
		3. Bhalwal	3856	Single
		4. Shahpur	1550	Single
		5. Sahiwal	1550	Single
		6. Kot Momin	3856 / 39/52	Single / Double
	Jhang	7. 18-Hazari	1550	Single

	Toba Tek Singh	8. Toba Tek Singh	4130	Single
		9. Kamalia	3856	Single
		10. Gojra	3856	Single
2	Muzaffargarh	11. Muzaffargarh	4130	Single
		12. Alipur	3856	Single
		13. Jatoi	4298	Double
		14. Kot Addu	3856	Single
	Layyah	15. Layyah	4860	Single
		16. Chaubara	3856	Single
17. Karor Lal Esan		1550	Single	
3	Nankana Sahib	18. Nankana Sahib	4860	Single
		19. Shahkot	1550	Single
		20. Sangla Hill	1550	Single
	Kasur	21. Kasur	4130	Single
	Okara	22. Okara	3693	Single
		23. Depalpur	5327	Double
24. Renala Khurd		4298	Double	
4	Multan	25. Multan City	5786	Double
		26. Multan Saddar	5449	Double
		27. Shujabad	3856	Single
		28. Jalalpur Pirwala	3693	Single
5	Sheikupura	29. Sheikupura	4130	Single
		30. Sharqpur	1550	Single
		31. Ferozewala	5327	Double
		32. Safdarabad	1550	Single
		33. Muridke	3952	Double
	Gujranwala	34. Nowshera Virkan	1550	Single

6	Bahawalpur	35. Bahawalpur Saddar	3693	Single
		36. Yazman	1550	Single
		37. Ahmadpur East	3856	Single
		38. Hasilpur	1550	Single
		39. Khairpur Tamewali	1550	Single
	Rahim Yar Khan	40. Rahim Yar Khan	4130	Single
		41. Khanpur	3856	Single
		42. Liaquatpur	4130	Single
		43. Sadiqabad	3856	Single

5. Legal and Policy Overview

The present EMP has been developed after reviewing the relevant promulgated environmental legislation and guidelines of Pakistan and the World Bank's safeguard policies. These legislations and safeguard policies, and their relevance to the proposed project, are briefly discussed below.

- a. **The Pakistan Environmental Protection Act 1997:** The basic purpose of this enactment is protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution and promotion of sustainable development. It would not be out of place to mention that the guidelines provided to the contractors/consultants to be kept in view during the construction of these buildings are in line with the standards specified under this act.
- b. **Pakistan Environmental Protection Agency Review of IEE & EIA Regulations, 2000:** The construction activities under the LRMIS Project do not fall under any of the Schedule-I or Schedule-II of the Regulations, which define the categories of projects requiring IEEs and EIAs to be carried out. Therefore these construction activities would not require preparation of IEE or EIA report.
- c. **WB OP 4.01 (Environmental Assessment):** This operational policy (OP) requires EA to be conducted of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable with an objective to improve decision making process. The present EMP has been developed in response to this OP.

The OP also categorizes the project in one of the four categories on the basis of the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

The proposed construction activities have been classified as Category B, since these activities can potentially have negative impacts on environment and human population, though these impacts are site-specific and can be eliminated/controlled/reduced by implementing properly designed mitigation measures.

- d. **Other WB OPs:** The WB OP 4.04 (Natural Habitats), OP 4.09 (Pest Management), OP 4.11 (Physical Cultural Resources), OP 4.36 (Forests), OP 4.37 (Safety of Dams), OP 7.50 (Projects on International Waterways), OP 7.60 (Projects in Disputed Areas) are not relevant for the construction activities under LRMIS, hence these OPS are not triggered.

6. Environmental Screening of Potential Impacts

6.1 The potential impacts of the construction activities (listed in Section-3 above) are as under. The response against each impact has also been provided by the Civil Works Consultant.

6.1.1 Design considerations. The design of the building should comply with the applicable bye-laws of the city/town, including compliance with the design compatibility to earthquake resistance, where the public facility is being constructed.

Response: The building designs prepared by the Consultant for the subject project comply with the applicable bye-laws of the city/town. According to Govt. Regulation, the area of Punjab has been categorized under earthquake Zone-3, 2A & 2B. The Consultant followed the Building Codes of Pakistan (BCP) 2007, Uniform Building Code (UBC) 1997 and ERRA Interim Guidelines.

6.1.2 Soil erosion/subsidence. This may be caused by the excavation for foundations, particularly in view of the most of the constructions being carried out adjacent to the existing buildings.

Response: Safe distance is maintained between the existing building and adjacent building as a prevention to soil erosion / subsidence.

6.1.3 Contamination of soil and waters. This could be caused by the open discharge of contaminants, such as toilet waste.

Response: Design included the proper sewerage system for discharge into the sewer system, wherever available. Provision for a septic tank and soakage pit has been provided where the city sewer is not available in the vicinity.

6.1.4 Choking of the existing sewers/drains. This could be caused by the uncontrolled release of effluents (such as washings during laying and polishing the marble floor), and debris into the existing sewers/drains.

Response: Since there will be no sewer connection to the existing sewer line during the construction, the question of release of effluents (such as washings during laying and polishing the marble floor), and debris into the existing sewers/drains does not arise. The quantity would be small limited to a paste of marble of 5 to 8 cft., which will be accumulated in the nearby ditch for disposal.

6.1.5 Increased sediment load in receiving waters. This could be caused by the uncontrolled release of waste effluents/debris in the surroundings.

Response: The release of waste effluents/debris in the surroundings of the building will not be uncontrolled. As a matter of fact the debris will be disposed off at a safe distance. The scope has been specified in the General Specification. Refer clause 12 read with clause 22 of Section-01000 (General Requirements) of General Specifications.

6.1.6 Construction waste. This could cause soil and water contamination, blockage of natural drainage, blockage of access roads/paths, and public nuisance.

Response: The disposal of construction waste in the surroundings of the building will not be uncontrolled. As a matter of fact the construction waste will be disposed off in such a manner that it will not cause soil and water contamination, blockage of natural drainage, blockage of access roads/paths, and public nuisance.

6.1.7 Blockage of access/roads. This could be caused by inappropriate stock-piling of the construction material on the roads in front of the construction site.

Response: The stock-piling of the construction material will not be on the roads, it is envisaged that it will be at a suitable place at site given to the Contractor.

6.1.8 Air quality deterioration. This could be caused by the dust emissions from the construction activities such as excavation, and exhaust from diesel generators.

Response: Although, it is very difficult to control the air quality, the dust emissions may be mitigated or reduced by sprinkling water on the excavated material. Diesel generators will not be used on full time bases, and as such the risk for the air quality deterioration may not be significant.

6.1.9 Noise and vibration. This could be caused by various construction activities, most notably, operation of concrete mixers, diesel generators, carpentry, and floor grinding.

Response: Since, heavy machinery may not be used on the subject project, the effect of noise and vibration would be insignificant.

6.1.10 Increased vehicular traffic. This could be caused by the transportation of the construction materials.

Response: The quantity of construction material for small building having floor area of about 4500 sqft on the average is not such that the transportation of the construction materials will have an impact on the significant increase of vehicular traffic. Moreover, the transportation of construction material will not be on continued basis and would be occasional.

6.1.11 Damage to biological resources (flora and fauna). The construction activities may damage the flora and fauna of the nearby areas.

Response: The nearby areas of the proposed sites are mostly in the built up of the city/town, therefore the question of damage the flora and fauna of the nearby areas does not arise.

6.1.12 Safety hazards. This could be caused by the operation of machinery, loading/unloading of material, or lack of safety railings where needed.

Response: The proposed buildings are simple limited to maximum two (2) storeys having minimum risk to safety hazards caused by operation of heavy machinery and loading/unloading of construction material.

6.2 Implementation Strategy

All of the above impacts are localized, of low intensity, temporary in nature, and can easily be avoided or mitigated with the help of simple ‘good practice’ precautionary measures. These mitigation measures are provided in the Environmental Screening Checklist, attached as **Table 1** below.

This Checklist is provided to the construction contractors, who will implement the mitigation measures, where applicable, to address the negative environmental impacts of the construction activities at each site.

For Package-2 and Package-3, the Environmental Screening Checklist (**Table 1**) will be filled at each construction site at the outset by the respective contractor. The civil works in Package-2 and Package-3 are going to be started shortly for which we have provided the Checklist to the Contractors through the Consultant. The filled checklist will be reviewed by the Resident Engineer during his/her site visit under the overall supervision of the Consultant & EC PMU.

6.3 Buildings of Package-1

It is intimated that the construction work at all the seven (7) buildings of Package-1 is at final stage. The Environmental Screening Checklist (Table-1) has been provided to the contractors through the Consultant for implementation. The check-list devised to cater for EMP impacts will be got filled by the contractors. It will be ensured that all corrective/mitigation measures are completed before taking over the building.

7. Environmental Monitoring

Environmental monitoring will be carried out with the help of the Environmental Monitoring Checklist provided in **Table 2**. The monitoring will be carried out by the Resident Engineer (RE) of the Supervision Consultants, during his/her regular site visits. The filled Environmental Screening Checklist of each site will be used as the basis of the environmental monitoring.

8. Institutional and Reporting Arrangements

The LRMIS Project Director will be overall responsible for the EMP implementation. The LRMIS Procurement Specialist (Civil Works) will be designated as the LRMIS Environmental Coordinator (EC), who will ensure that the present EMP is effectively implemented. The EC will ensure that the Environmental Screening Checklist (**Table 1**) is provided to each of the construction contractors and the Supervision Consultants. S/he will hold meetings with the contractors, if needed, to facilitate implementation of the mitigation measures provided in the Checklist.

The Environmental Screening Checklist (**Table 1**) will be filled at each construction site at the outset by the respective contractor, as stated earlier as well. The original filled Checklist will be kept at the respective site; copies of the filled Screening Checklists will be provided to the RE and EC.

The EC will also ensure that the environmental monitoring is carried out regularly during the entire construction phase. The filled Environmental Monitoring Checklist after each monitoring visit will be sent to the EC, who will maintain complete record of these Checklists. S/he will also prepare a quarterly report on the basis of the filled checklists, summarizing the salient information and outcome of the environmental monitoring of each construction site. These quarterly reports will be provided to the LRMIS Project Director, and will also be shared with the World Bank.

9. EMP Cost

The EMP implementation is not likely to incur any additional cost, since no additional manpower will be required for the EMP implementation. Moreover, implementation of the mitigation measures provided in the Environmental Screening Checklist (**Table 1**) is not likely to cause any cost increase either, since these are 'good practice' precautionary measures, as described earlier. Similarly, the environmental monitoring will also not incur any additional cost, since it will be carried out by the Contractors and inspected by the R.E. during the field visits which s/he is supposed to conduct for the supervision of the technical aspects of the construction activities.

Table 1: Environmental Screening Checklist

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Notes
1. Does the building design violate all or some of the applicable bye-laws?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The building design to follow all the applicable bye-laws including seismic zone compatibility, and the necessary approvals to be obtained from the relevant authority. The sewerage from the new facility should be released in the city sewer. If city sewer not available, appropriate sewerage treatment and disposal arrangements (such as septic tank and soakage pit) will be included in the facility design. The buildings should have provisions to facilitate handicapped persons (eg, ramps, toilets allowing wheel chairs to enter, etc.)	
2. Can the construction works cause soil subsidence and/or erosion?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Take all measures - such as fixing of protective meshing/wire net, construction of embankments, retaining walls, and/or protective walls - to avoid any soil subsidence and erosion.	
3. Are the contaminants (such as toilet waste) from the construction site being released to the environment?	<input type="checkbox"/> Yes <input type="checkbox"/> No	No contaminated effluents will be discharged to the ground or nearby drains. The existing toilet facilities will be used if available. Otherwise temporary toilet facility either connected with the sewer system, or having appropriate disposal system such as septic tank and soakage pit will be established at the site.	
4. Are the effluents from the site causing or likely to cause additional sediment load in the receiving water?	<input type="checkbox"/> Yes <input type="checkbox"/> No	No sediments (such as from marble floor grinding) or debris will be released/disposed in the open/nearby water ways. Appropriate sediment control measures will be taken to prevent sediments from moving offsite and causing excessive turbidity in the waterways.	

Table 1: Environmental Screening Checklist

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Notes
5. Are the effluents or debris from the site choking or likely to choke the existing sewer or drain?	<input type="checkbox"/> Yes <input type="checkbox"/> No	No sediments (such as from marble floor grinding) or debris will be released/disposed in the drains. Appropriate sediment control measures will be taken to prevent sediments from entering the drains/sewer.	
6. Are the construction activities producing or likely to produce significant quantities of construction wastes?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waste collection and disposal arrangements/locations will be identified for all major waste types expected from the construction activities. Construction waste will be disposed properly using the approved method at approved locations. The records of waste disposal will be maintained as proof for proper management as designed/planned. Wherever feasible, the waste will be reused and/or recycled.	
7. Are the construction activities blocking or likely to block any road/access/approach?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The construction machinery should not be placed in a manner that blocks any roads, paths or local accesses. The construction material or wastes should be placed in an orderly manner, avoiding blockage of any roads, paths or local accesses. The unloading of the construction material will be carried out in a manner so as to avoid blockage of the roads/paths/accesses.	

Table 1: Environmental Screening Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Notes
8. Are the construction activities causing or likely to cause air quality deterioration?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The diesel-powered machinery (such as diesel generator) should be kept in good working condition, minimizing the exhaust emissions. Use chutes to transfer demolition debris from upper floors, where needed. Keep the surroundings free from debris to minimize dust. There will not be excessive idling of construction machinery/vehicles at site. Water sprinkling will be carried out in case of excessive dust emissions. Periphery screens will be used around the work site.	
9. Are the construction activities causing or likely to cause excessive noise and vibration?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Nighttime construction will be avoided, particularly the noise generating activities. The powered machinery (such as diesel generator and concrete mixer) will have proper silencers (mufflers). This machinery will be placed as far from the residential areas as possible.	
10. Are the construction activities causing or likely to cause traffic congestion/blockage on the nearby roads?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The transportation of the construction material will be scheduled to avoid rush hours. The unloading of the construction material will be carried out in a manner so as to avoid traffic blockage.	

Table 1: Environmental Screening Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Notes
11. Are the construction activity causing or likely to cause negative impacts on the biological resources?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Tree cutting at the construction site will be avoided as far as possible. Compensatory tree plantation will be carried out at the site if tree cutting is necessary. Mark and cordon of any large tree in the vicinity of the construction activity, protect its root system, and avoid any damage to it.	
12. Are there any safety hazard concerns for the workers or the nearby population?	<input type="checkbox"/> Yes <input type="checkbox"/> No	All works to be carried out in a safe and disciplined manner. Workers will use appropriate personal protective equipment (PPE), including hard hats and safety boots (always), and masks, goggles and harnesses (as needed). Appropriate safety railings/fencing will be installed where needed (eg, around the excavated areas, at the upper floors/higher elevations). No un-authorized access to the site will be allowed. All measures will be taken to protect the nearby population, particularly children, from the construction activities, loading/unloading of material, and machinery/vehicle operation. Appropriate signage will be fixed at the site to inform/educate the workers to follow the key rules, regulations, and safety practices. Fire extinguishers and first-aid boxes will be made available at the site. List of important telephone numbers (fire stations, hospitals, police and others) will be placed at the appropriate location at the site.	

Table 1: Environmental Screening Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Notes
13. Is the site to be restored to original or better condition after the works completion?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The site to be completely restored to original or better condition. No ditches or surplus soil will be left behind. No debris, wastes, un-used construction materials, scrap, disused tools, equipment, or scaffolding will be left behind at the site.	

Checklist filled by (Name, Designation, Signature):

Date:

Checklist reviewed by (Name, Designation, Signature):

Date

Table 2: Environmental Monitoring Checklist

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Mitigation measures implemented?	Notes/Reason for non-compliance – Further Action – fix responsibility
1. Does the building design violate all or some of the applicable bye-laws?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The building design to follow all the applicable bye-laws including seismic zone compatibility, and the necessary approvals to be obtained from the relevant authority. The sewerage from the new facility should be released in the city sewer. If city sewer not available, appropriate sewerage treatment and disposal arrangements (such as septic tank and soakage pit) will be included in the facility design. The buildings should have provisions to facilitate handicapped persons (eg, ramps, toilets allowing wheel chairs to enter, etc.)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2. Can the construction works cause soil subsidence and/or erosion?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Take all measures - such as fixing of protective meshing/wire net, construction of embankments, retaining walls, and/or protective walls - to avoid any soil subsidence and erosion.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3. Are the contaminants (such as toilet waste) from the construction site being released to the environment?	<input type="checkbox"/> Yes <input type="checkbox"/> No	No contaminated effluents will be discharged to the ground or nearby drains. The existing toilet facilities will be used if available. Otherwise temporary toilet facility either connected with the sewer system, or having appropriate disposal system such as septic tank and soakage pit will be established at the site.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Table 2: Environmental Monitoring Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Mitigation measures implemented?	Notes/Reason for non-compliance
4. Are the effluents from the site causing or likely to cause additional sediment load in the receiving water?	<input type="checkbox"/> Yes <input type="checkbox"/> No	No sediments (such as from marble floor grinding) or debris will be released/disposed in the open/nearby water ways. Appropriate sediment control measures will be taken to prevent sediments from moving offsite and causing excessive turbidity in the waterways.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5. Are the effluents or debris from the site choking or likely to choke the existing sewer or drain?	<input type="checkbox"/> Yes <input type="checkbox"/> No	No sediments (such as from marble floor grinding) or debris will be released/disposed in the drains. Appropriate sediment control measures will be taken to prevent sediments from entering the drains/sewer.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6. Are the construction activities producing or likely to produce significant quantities of construction wastes?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Waste collection and disposal arrangements/locations will be identified for all major waste types expected from the construction activities. Construction waste will be disposed properly using the approved method at approved locations. The records of waste disposal will be maintained as proof for proper management as designed/planned. Wherever feasible, the waste will be reused and/or recycled.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Table 2: Environmental Monitoring Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Mitigation measures implemented?	Notes/Reason for non-compliance
7. Are the construction activities blocking or likely to block any road/access/approach?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The construction machinery should not be placed in a manner that blocks any roads, paths or local accesses. The construction material or wastes should be placed in an orderly manner, avoiding blockage of any roads, paths or local accesses. The unloading of the construction material will be carried out in a manner so as to avoid blockage of the roads/paths/accesses.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8. Are the construction activities causing or likely to cause air quality deterioration?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The diesel-powered machinery (such as diesel generator) should be kept in good working condition, minimizing the exhaust emissions. Use chutes to transfer demolition debris from upper floors, where needed. Keep the surroundings free from debris to minimize dust. There will not be excessive idling of construction machinery/vehicles at site. Water sprinkling will be carried out in case of excessive dust emissions. Periphery screens will be used around the work site.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Table 2: Environmental Monitoring Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Mitigation measures implemented?	Notes/Reason for non-compliance
9. Are the construction activities causing or likely to cause excessive noise and vibration?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Nighttime construction will be avoided, particularly the noise generating activities. The powered machinery (such as diesel generator and concrete mixer) will have proper silencers (mufflers). This machinery will be placed as far from the residential areas as possible.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10. Are the construction activities causing or likely to cause traffic congestion/blockage on the nearby roads?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The transportation of the construction material will be scheduled to avoid rush hours. The unloading of the construction material will be carried out in a manner so as to avoid traffic blockage.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11. Are the construction activity causing or likely to cause negative impacts on the biological resources?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Tree cutting at the site will be avoided as far as possible. Compensatory tree plantation will be carried out at the site if tree cutting is necessary. Mark and cordon of any large tree in the vicinity of the construction activity, protect its root system, and avoid any damage to it.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Table 2: Environmental Monitoring Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Mitigation measures implemented?	Notes/Reason for non-compliance
12. Are there any safety hazard concerns for the workers or the nearby population?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>All works to be carried out in a safe and disciplined manner. Workers will use appropriate personal protective equipment (PPE), including hard hats and safety boots (always), and masks, goggles and harnesses (as needed).</p> <p>Appropriate safety railings/fencing will be installed where needed (eg, around the excavated areas, at the upper floors/higher elevations).</p> <p>No un-authorized access to the site will be allowed. All measures will be taken to protect the nearby population, particularly children, from the construction activities, loading/unloading of material, and machinery/vehicle operation.</p> <p>Appropriate signage will be fixed at the site to inform/educate the workers to follow the key rules, regulations, and safety practices.</p> <p>Fire extinguishers and first-aid boxes will be made available at the site.</p> <p>List of important telephone numbers (fire stations, hospitals, police and others) will be placed at the appropriate location at the site.</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Table 2: Environmental Monitoring Checklist (Contd.)

Environmental impacts	Status	Mitigation Measures (if the status is 'Yes')	Mitigation measures implemented?	Notes/Reason for non-compliance
13. Is the site to be restored to original or better condition after the works completion?	<input type="checkbox"/> Yes <input type="checkbox"/> No	The site to be completely restored to original or better condition. No ditches or surplus soil will be left behind. No debris, wastes, un-used construction materials, scrap, disused tools, equipment, or scaffolding will be left behind at the site.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Checklist filled by (Name, Designation, Signature):

Date:

Checklist reviewed by (Name, Designation, Signature):

Date