Environmental Impact Assessment

Project No. 47279-002
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PAK: Karachi Bus Rapid Transit Project

Part 3

Prepared by the Transport and Mass Transit Department, Government of Sindh, for the Asian Development Bank.

7. Environmental Management Plan

7.1 Organization of the Chapter

535. The Environmental Management Plan (EMP) describes the institutional framework and mitigation measures aimed at specific types of impact. Institutional aspects are described for two phases of the KBRT Project, construction and operations. Environmental components of planning and design are described, followed by construction mitigation measures and those related to operations. Further sections describe the training proposal and costs associated with all aspects of the EMP.

536. Agencies engaged in the process of environmental management as described in this chapter are: the Sindh Mass Transit Authority Project Implementation Unit (SMTA PIU)[23]; the Construction Supervision Consultant (CSC)[24], hired to support the PIU in construction management; and the contractor(s)[25] performing the construction activity. The TMTD/SMTA PIU provides the authority for enforcing mitigation measures during the construction period, supported by the CSC. SMTA in its operations role in environmental management will come to the forefront during the operations phase.

7.2 Acquisition of No-Objection Certificates

537. The KBRT Project transport planning effort began with a Project Preparation Technical Assistance (PPTA) undertaken under ADB funding in and completed in 2016. The Initial Environmental Examination (IEE) underwent an initial public review through stakeholder consultation.

538. This EIA is an update of the IEE conducted during the detailed design phase. Along with a public hearing, it provides the basis for review by the Sindh EPA (SEPA), as required under the Sindh Environmental Protection Act (2014). Acquisition of a No-Objection Certificate (NOC) is contingent on approval of the EIA by the SEPA.

539. The Sindh EPA Regulations (2014) pursuant to the Act state that when filing an EIA, “no objection certificates from the relevant departments shall be the part of reports.” Departments from which NOCs may potentially be required include:

- Sindh Environmental Protection Agency (approval of the EIA)
- Karachi Metropolitan Corporation
- Department of Antiquities GOS
- Parks & Horticulture Department GOS
- Utilities

[23] The Transport and Mass Transit Department (TMTD) of the Sindh Government houses the Sindh Mass Transit Authority (SMTA) and Project Implementation Unit (PIU) for the Karachi Bus Rapid Transit Project (KBRT Project). Initially, the TMTD also housed the Sindh Mass Transit Cell (SMTC), which functioned as the lead agency prior to the set-up of SMTA.
[24] CSC”, or similarly designated organization, is hired under a different arrangement than the EPCM consultant, whose work extends only through contract preparation and support in tendering. See Sec. 7.4.1 for further explanation of this arrangement
[25] Parsing of work packages and number of contracts to be awarded is not yet determined.

540. No objection certificates (NOCs) are also required from local government units and cantonment authorities where the project alignment is located in their respective jurisdictions. NOCs from local governments may need to address specifically the depot sites.

7.3 Periods of Applicability

541. According to the Sindh EPA Regulations (2014), "the approval accorded by the Agency . . . shall be valid, for commencement of construction, for a period of three years from the date of issue" which shall be extended another three years if construction is commenced during the initial three-year period. Following that, "the proponent may apply to the Agency for extension in the validity periods, which may be granted by the Agency for such period not exceeding three years at a time."

7.4 Environmental Management Framework

542. The TMTD PIU is supported on safeguard issues from the CSC hired through the ADB Project Design Advance (PDA) loan. Strategic and policy aspects of SMTA operations, are being developed through the project management, coordination, and capacity building (PMCCB) component of the PDA loan and are still formative. The PMCCB consultant is responsible for providing institutional recommendations for environmental and social functions at SMTA, and hence these aspects are not included in recommendations in this EMP.

543. Near term institutional arrangements are needed to monitor contractor performance in implementing environmental protection measures described in the environmental management plan (EMP). As earlier stated, enforcement is done under the authority of the TMTD PIU, with technical support from the CSC. The following sections describe the environmental management framework for the construction phase.

7.4.1 Roles of TMTD PIU and SMTA

544. Environmental and Social Safeguard specialists are available in PIU and their services will continue to be required, to oversee safeguards monitoring of the Project during construction operations. Positions of Environmental and Safety Officer (ESO) and Equal Opportunity, Gender and Social Specialist (EOGSS) posts will eventually be needed in the SMTA. Were they to be established in time, the ESO and EOGSS could be guided by specialist consultants from the CSC during the construction period.

7.4.2 Roles of EPCM and CSC Consultants during Design/Construction

545. The Phase I contract under the EPCM component covers detailed engineering design and procurement, wherein the Consultant prepares the design and bid documents, assistance in evaluation of bids, and documentation concerning environmental aspects, including preparation of this environmental impact assessment (EIA) and the EMP. The Phase I EPCM consultant also provides assistance to the TMTD PIU in public consultation and in communications with SEPA with respect to submittal of the EIA. The Phase II Construction Supervision Consultant (CSC) is hired separately to support TMTD PIU.

546. Project Management will be performed by the CSC headed by a full-time Project Manager/Resident Engineer to take responsibility for and manage activities of the CSC. The CSC will be responsible for the following in relation to their works: (i) assisting the PIU in implementing the Project; (ii) carrying out procurement and engaging and contractors; (iii) liaising and coordinating with the TMTD and other authorities; (iv) managing the contractors; and (v) liaising with other stakeholders on the day to day implementation of Project activities. TMTD will receive support from the CSC to implement the environmental and resettlement plans. Safeguard specialists for environment and resettlement will be part of the CSC to oversee implementation of the environmental and resettlement plans prior to the bidding stage to ensure the bidding documents include all environmental management requirements.

547. The Phase II CSC will engage one International Environmental Specialist (IES intermittent—6 months) and three National Environmental Consultants (NECs full time X 3—54 mo)[26]. The IES and NEC specialists will also conduct safeguards capacity building activities in the PIU among staff assigned to Environmental and Social Safeguards. The CSC will check that all environmental design requirements are included in the design and in the bidding documents, including the EMP, carry out monitoring of mitigation measures undertaken by the Construction Contractors, and provide training to the PIU staff.

7.4.3 Role of the Contractor

548. The civil works contractor will be responsible for fulfilling contract conditions related to environmental mitigation and monitoring. The contractor is responsible for implementing all environmental, health and safety actions described in the EMP and relevant clauses in the bidding documents and contract during the pre-construction and construction period.

549. The contractor will prepare the Construction SSEMP based on the site-specific construction methodologies it proposes to use and the EMP in this EIA. The SSEMP will further develop the EMP and will provide detailed measures on how it will mitigate impacts, including but not limited to air pollution and noise, traffic, health and safety risk, drainage and sediment, spoil and solid wastes, hazardous materials and other impacts identified in the EIA. The CSC acting for the PIU will review the SSEMP before the commencement of construction. Acceptance does not preclude introducing further actions into the plans as required by circumstances, and monitoring will be conducted for compliance with the original requirements of the EMP contained in the EIA.

550. The contractor will appoint an Environmental Management officer (EMO) and a Health and Safety Officer (HSO) who will be responsible for implementing the mitigation measures and specific management plans required under the EMP. Site inspections will be conducted on a daily and weekly basis to check compliance with the approved SSEMP and ensure implementation of all health and safety requirements.

551. The responsibilities of the Contractor include:

- Participate in induction on EMP and mitigation measures to be delivered by CSC and PIU prior to preparation of the SSEMP;

[26] The Phase II TOR also calls for a resettlement specialist (national) for 12 mo and a social development specialist (national) for 6 mo.

- Preparing and submitting the SSEMP to the PIU;
- Appointing EMO and HSO, confirming that these positions have been filled and by whom with the CSC and PIU before construction commences;
- Seeking training and support from PIU on any aspects of environmental management, as required;
- Once construction starts, the EMO is responsible for ensuring that the Contractor complies with the clauses in the contract and bidding documents in respect of environment, health and safety;
- As required, preparing, and submitting for approval, appropriate plans (tree cutting, aggregate extraction, traffic management etc.);
- Engaging an Independent Monitoring Group (IMG) to maintain a continuous (quarterly) monitoring record of ambient environmental parameters;
- Engaging an approved service provider to undertake HIV/AIDS briefings and awareness raising amongst the contractor's employees and communities, and reporting on the same;
- Coordinating with PIU in respect of community consultation i.e. establishing GRM etc; and
- Participating in monitoring and coordinating with PIU to ensure that environmental management activities are reported in Monthly Progress Reports as required.

7.4.4 Role of Sindh Environmental Protection Agency (SEPA)

552. SEPA will review the statutory environmental assessment. Approval will be conditional on the proponent providing commitment to implement all mitigation measures in the environmental assessment and environmental management plan along with any additional requirements set out in the environmental approval.

553. Ongoing consultation with SEPA will be required during the construction of the project. SEPA will be asked to assist in the monitoring of implementation of the SSEMP and ensure that environmental management and mitigation of the project is undertaken to an acceptable standard. Periodic inspections will take place with SEPA, TMTD PIU, CSC and Contractors.

554. The full scope of responsibilities for EMP implementation is shown in Table 7-1

Table 7-1: Responsibilities for EMP Implementation

Agency	Responsibilities
Government of Sindh Transport & Mass Transit Department PIU	▪ Executing agency with overall responsibility for project construction and operation ▪ Ensure that sufficient funds are available to properly implement the EMP ▪ Ensure that the Project, regardless of financing source, complies with the provisions of the EMP and ADB Safeguard Policy Statement 2009 (SPS) ▪ Ensure the Design and Supervision Consultant (CSC) are retained for the duration of the project construction ▪ Ensure in the CSC Contract that the CSC is required to incorporate all design mitigation and monitoring measures for various project phases as specified in the EMP ▪ Ensure that Project implementation complies with Government environmental policies and regulations ▪ For project duration ensure that the Design and Supervision Consultant (CSC) commit and retain sufficient dedicated staff as environment and safety managers to accomplish the EMP implementation effectively. ▪ Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed designs. ▪ Obtain necessary environmental clearances certification under SEP Act from SEPA prior to award of civil works contracts ▪ Undertake periodic monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from CSC. ▪ Establish and implement an environmental grievance redress mechanism, as described in the EIA, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance. ▪ Confirm that bidding and contract documents include the EMP ▪ Submit quarterly environmental monitoring reports on EMP implementation to ADB
Design and Supervision Consultant (CSC)	▪ Support the PIU to implement project in line with ADB's Safeguards Policy Statement (SPS 2009) principles and requirements ▪ Engage one ESC with at least 10 years' field experience in project implementation of environmental management and safety safeguards to ensure proper implementation of EMP provisions and SPS. ▪ Commit and retain three national environmental and safety staff (NEC) within CSC to oversee EMP implementation. ▪ When detailed designs are confirmed, on behalf of the PIU (project proponent) prepare and submit statutory EIA and obtain environmental clearance certification prior to project construction and obtain endorsement from ADB. ▪ Ensure bid documents contain all environmental requirements and mitigation measures, including necessary provisions for traffic management, utilities re-provisioning, temporary drainage and runoff control, waste management and spoils disposal, noise and dust control, etc. as described in the EMP. ▪ Check that environmental protection and mitigation measures in the EMP are incorporated in the detailed designs. ▪ Ensure that bidding and contract documents include the EMP and that they are drawn to the attention of bidders, especially at the pre-bid meeting by the PIU ▪ Incorporate into the project design the environmental protection and mitigation measures identified in the EMP for the design stage ▪ Update the EMP based on final design provisions and requirements of SEPA ▪ If the detail design changes the footprint or alignment of the project, execute any additional environmental assessment prior to project construction as required in the EMP ▪ Prior to construction, review and approve in writing the updated SEMPs/method statements prepared in consultation with contractors ▪ Undertake environmental awareness training and environmental management capacity building activities for TMTD and the PIU and Contractors as described in this EIA and EMP ▪ Ensure that EMP provisions are strictly implemented during various project phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels ▪ Participate in an environmental grievance redress mechanism, as described in the EIA, to receive and facilitate resolution of affected peoples' concerns,

Agency	Responsibilities
	complaints, and grievances about the Project's environmental performance ▪ Report to ADB on all aspects of environmental management and monitoring at quarterly intervals, based on the results of EMP monitoring ▪ Based on the results of EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB ▪ Implement all design mitigation and monitoring measures for various project phases specified as CSC's tasks in the EMP and Contract. ▪ Ensure contractor implements all environmental mitigation and monitoring measures for various project phases specified in the EMP and Contract.
Contractor	▪ Acknowledge and understand the environmental requirements in the bidding and contract documents including the EMP and raise any queries early in the bid process, no later than the pre-bid meeting to avoid miss-understanding later ▪ Recruit qualified environmental management officer (EMO) with sufficient practical experience to ensure compliance with environmental statutory and contractual obligations and proper implementation of the EMP. ▪ Prior to start of construction, co-ordinate with the CSC to update the EMP and provide an SEMP for approval by CSC and endorsement by the PIU and ADB ▪ Implement all environmental mitigation and monitoring measures for various project phases specified for the Contractor in the EMP and Contract ▪ Implement traffic management, utility and telecoms re-provisioning plan in close coordination with relevant authorities ▪ Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP ▪ Implement additional environmental mitigation measures for unexpected impacts, as necessary and as directed by the PIU, CSC and ADB
BRT Operator(s)	▪ Responsible for operation and maintenance of Project corridor ▪ Implement operational mitigation measures and EMP monitoring during operation
Sindh Environment Protection Department (SEPA)	▪ Review and approve requisite (Government) environmental assessment report(s). ▪ Monitoring Project's environmental performance based on their mandate. ▪ Enforce Sindh Environmental Quality Standards (SEQS) ▪ Assist proponent to implement self-monitoring & reporting for the Project ▪ Advise Proponent on preventive measures for abatement of pollution. ▪ Assist Proponent with scheme for proper waste disposal to comply with SEQS ▪ Attend to public complaints. ▪ Review environmental assessment and periodic monitoring report(s). ▪ Monitoring Project's environmental performance based on Sindh EP Act. ▪ Monitor public complaints via the GRM records.
Third Party Environmental Consultant	▪ Carry out independent monitoring at critical locations during construction stage ▪ Monitor health and safety areas ▪ Monitor GRM and resolution of complaints ▪ Inform ADB / EA of any significant impacts arising during construction ▪ Preparation of corrective action plans as needed ▪ Monitor plan implementation along with Project Implementation Consultant

7.4.5 Environmental Management Plan and Construction Specification

555. The portions of this EMP that are applicable to construction, specifically those sections that are to be performed by the Contractor, are included by reference in the Environmental Construction Specification (ECS), which is to be included in the contract bid documents and becomes part of the performance specification bound into the contract. Other specifications may also be attached to the bid documents to address, as necessary, occupational health and safety, traffic management, and other issues.

556. The ECS consists of measures specified in the EMP for mitigation of construction-related impacts. The draft Environmental Construction Specification (ECS) is shown in Appendix G, and will be modified to fit specific contract packages, once these are defined.

7.4.6 Construction Environmental Management Plan

557. The Contractor's Site-Specific Construction Environmental Management Plan (SSEMP) is the Contractor's detailed plan for meeting the requirements of the ECS. Since the ECS is a general specification, it is the Contractor's responsibility to prepare a site-specific SSEMP that addresses how the Contractor will perform the mitigation measures described in the EIA, in terms of location and frequency; and commitment of labor, equipment, other resources and expenditure; as applicable to a particular requirement. The SSEMP is expected to contain site- and media-specific sub-plans to address the following:[27]

i. Air Quality Control
ii. Noise Control
iii. Traffic Management
iv. Occupational Safety and Health
v. Site Specific Drainage Management
vi. Spoil and Solid Waste Disposal
vii. Utilities and Telecommunications Relocation

558. Other sub-plans may need to address tree planting and management; borrow areas; construction camps; water management; emergency response; training; local recruitment and hiring; security; fuel and hazardous materials management; and materials handling and storage, and other sub-plans as defined by the CSC.

559. The contents of these sub-plans are in many cases elaborations of preliminary planning done during detailed design by the Phase I EPCM consultant, as described in other sections of the EIA report.

560. The Contractor is required to appoint an Environmental Management Officer (EMO) to be responsible for implementing the SSEMP and liaising with the client and CSC.

561. The Contractor is required to appoint an Independent Monitoring Group (IMG) responsible for monitoring on a quarterly basis ambient air quality and noise levels in the vicinity of construction.

562. The SSEMP will provide an environmental management framework, identify the EMO for the contractor, describe location and frequency for monitoring of physical parameters (air, water, noise and vibration) in house and by the IMG; describe periodic in-house training for its own staff; and provide a reporting format, inclusive of forms and checklists and other necessary elements. The contractor is expected to mobilize necessary staff to carry out mitigation measures described in the SSEMP; to supervise skilled/unskilled labor; and to manage, review and periodically report on performance related to implementation of mitigation measures.

563. While it is the duty of the Contractor to manage environmental protection in keeping with its SSEMP, the Contractor is not absolved from meeting the terms of the EMP found in the EIA, which provides the basis for monitoring and inspection by the CSC.

[27].

7.4.7 Relationship among Groups

564. The organizational framework during construction consists of TMTD PIU, CSC environment staff, and the Contractor's EMO and support team. SEPA may also be involved in occasional site visits and monitoring of the site conditions. Entities are proposed to be organized as shown in Figure 7-1.

565. As stated earlier, the PIU provides the authority for enforcing mitigation measures during the construction period, supported by the CSC. The PIU has minimal staffing for direct engagement with field inspection activity, whereas the CSC serves as a technical secretariat for the PIU, being staffed with environmental specialists financed under the PDA and the ensuing loan precisely for the function of monitoring and reporting on contractor performance.

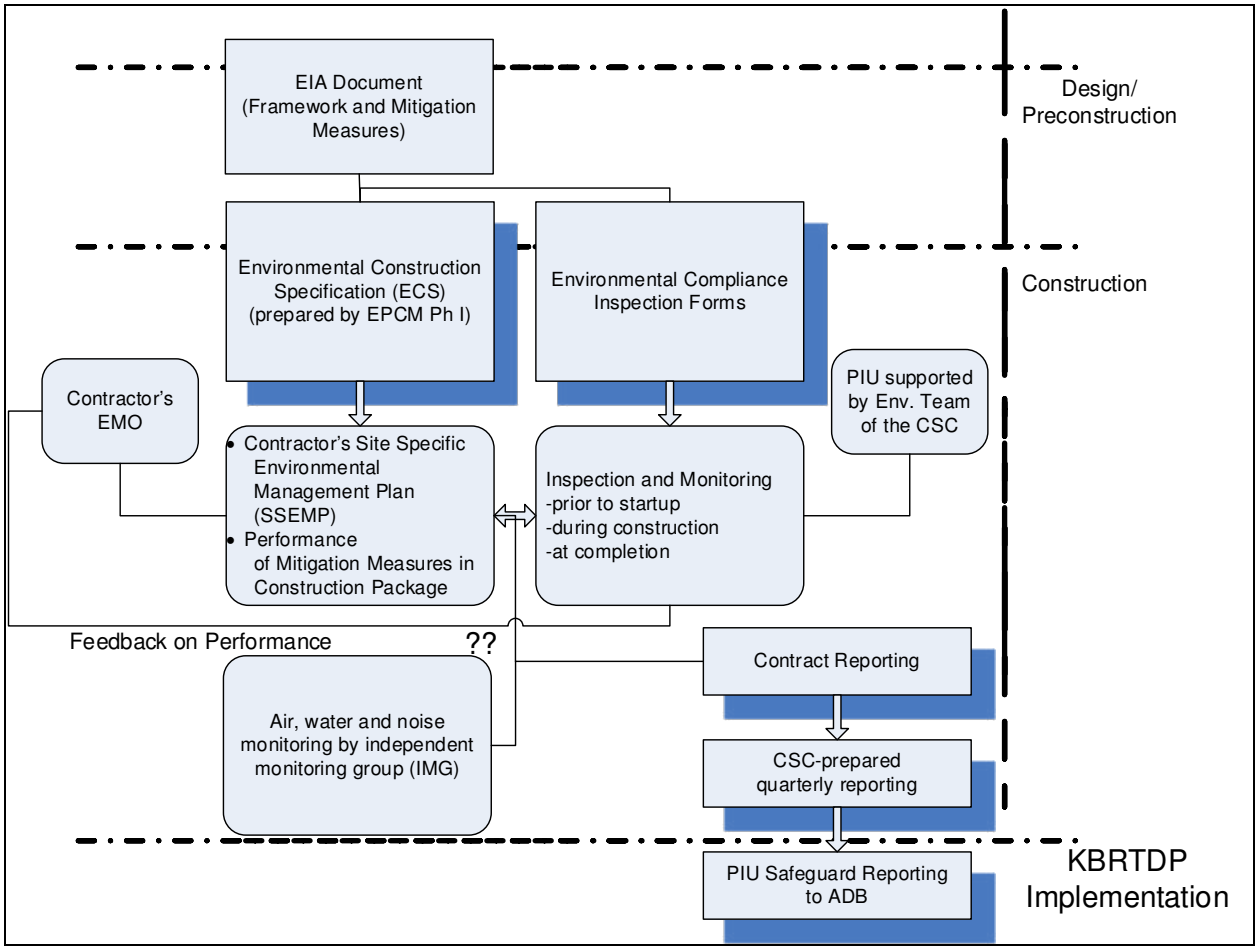

Figure 7-1: Organization for Environmental Management during Construction

7.4.8 Monitoring and Reporting during Construction

566. The system for monitoring compliance with environmental mitigation measures conforms to the general arrangement shown in Figure 7-2. The system provides periodic inspection (at least bi-weekly), data compilation, and reporting of results. The CSC environmental inspector will utilize a checklist to evaluate compliance with mitigation measures (see example in Appendix G).

Checklists serve primarily as guides for reviewing performance to determine general compliance with broad indicators, tentatively as follows:

i. General conduct of work
ii. Labor provisions and occupational health and safety
iii. Noise and vibration control
iv. Air quality, dust control and site cleanliness
v. Traffic management
vi. Drainage and wastewater
vii. Solid waste and spoil handling and disposal
viii. Protection of Community Values
ix. Environmental monitoring and other indicators selected for the work at hand.

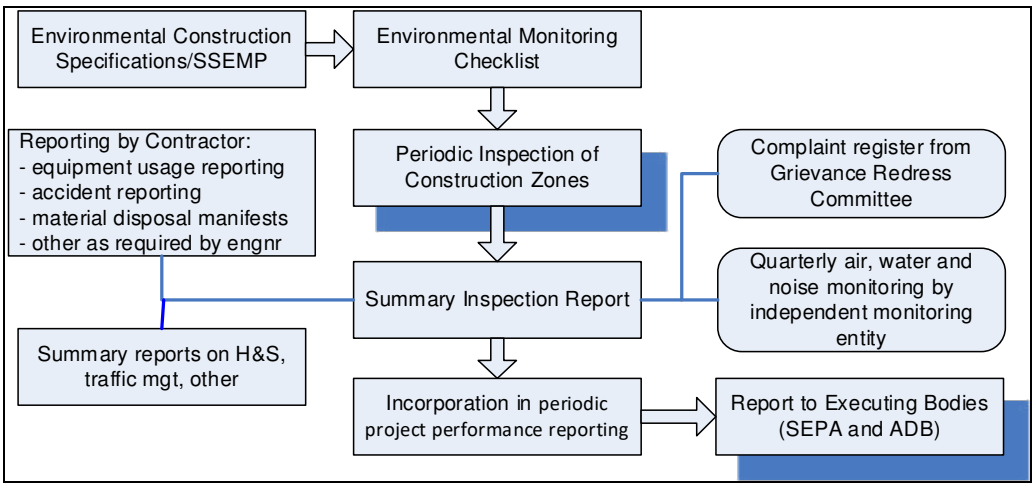

Figure 7-2: Flowchart for Environmental Monitoring and Reporting during Construction

567. The CSC will prepare quarterly reports that reflect performance of each contract over the period. Reports will be submitted to ADB (and to SEPA as required) as part of the periodic project performance reporting requirement. Monitoring reports also will summarize the status of complaints under the GRM, as well as results of air, water and noise monitoring conducted by the IMG. Table 7-2 summarizes the types of monitoring and reporting activities and identifies those responsible for undertaking tasks.

Table 7-2: Summary of Monitoring Requirements, Location and Frequency

Entity	Requirement	Location	Frequency
Contractor	Various job and labor monitoring requirements per good practice and specifications	Typically, at job sites; records held at main headquarters of contractor	Continuous
TMTD PIU	ECS and general workplace conditions	Job sites; project office	At least Bi-weekly
CSC	Support PIU in monitoring of ECS	Job sites; project office	At least Bi-weekly
IMG	Air, water, noise and vibration monitoring	Job sites	Quarterly, or more frequently in response to

	incidents

7.4.9 Grievance Redress Mechanism

568. The Contractor will consult with the local community before starting work that has the potential to cause adverse impact, to inform the community and obtain comments on means for minimizing impact.

569. A Grievance Redress Mechanism (GRM) will be established by the PIU which is described in full in the Resettlement Plan (RP)[28]. The Contractor will participate in the Grievance Redress Committee (GRC) alongside the PIU's representative as Chairperson; a representative of the local government body; and a representative for the CSC (engineer). Costs related to disclosure and GRM are part of EMP implementation borne by PIU and total 1.4 million Rs (current 2018 amount). The GRM will be used to receive and respond to complaints from individuals and the general community. Further details on the GRM is found in the RP and in Chapter 8 of this report.

570. Public notice of the GRM will be posted at the local government office and at the construction site in large print on durable material, stating the purpose of the GRM and phone numbers of persons to contact. The PIU and the Engineer will maintain a record of the status of any community complaints brought before the GRM.

7.5 Mitigation Measures

7.5.1 Periods of Applicability

571. This section is arranged in the design, construction and operations sequence, in which measures are implemented by a) EPCM Phase I consultant planning and design groups; b) construction contractors; and c) STMA and other agencies following commissioning.

7.5.2 Mitigation Measures applied during Design

572. MM has incorporated project design features addressing environmental concerns, health and safety, and energy conservation, which have been incorporated into the Project. These are described in previous sections of the EIA. MM conducted special studies to ensure safe, reliable project execution, such as the Traffic Management Plan, utility relocation plan, and an implementation framework for commissioning and operations. Some of the measures that have been incorporated into the design to mitigate specific types of impact are listed in Table 7-3.

Table 7-3: Environmental Protection Measures accounted for during Design Phase

Responsibility: MM (Mitigation Measures applied in Design Stage)	Cost Component
Accommodating increased flows due to climate change in drainage appurtenances	Not determined
Detailed Design Engineer to coordinate utility relocation prior to start of	Included in EPCM

[28] A GRM for environment and for resettlement should ideally be one and the same; however, often their aims are not the same, and require different memberships on the Grievance Redress Committee. This can be accommodated by setting up a single overarching committee, with different working groups to address environment and resettlement grievances separately.

Responsibility: MM (Mitigation Measures applied in Design Stage)	Cost Component
construction	design cost
Utilities to be relocated in advance of construction, preferably before award of construction contract	Cost of utility relocation not determined
Incorporate design measures to mitigate women's vulnerability during use of the BRT as described in Section 6.14.	Not determined.
[awaiting inputs from design and architecture]	[to be determined]

Costs

573. The costs associated with incorporating these measures are covered in the contract bid price for the project. Installed costs are estimated for the improvement in drainage systems along the alignment and near stations totaling [to be determined] Rs. These are incremental costs (over and above a system without the improvement). Other costs include compensation (determined by the RP), and provisional sums for road repair and utility reinstatement that have not been determined.

7.5.3 Construction

574. Mitigation measures identified in Chapter 6 to be undertaken during construction are consolidated.in Table 7-4 The list is arranged according to environmental parameters of interest, as follows:[29]

- Environmental parameter (air quality, noise abatement etc., A—L, there are 12 identified), followed by identification of where and when the environmental parameter is significant.
- Mitigation measure applied for protection of environmental parameter (numbered)
- Statement concerning Implementation: by whom, when
- Statement concerning Monitoring: by whom, when

Table 7-4: Environmental Mitigation Measures during Construction

Construction Mitigation Measures	Timing	Location	Responsibility
A. **Air Quality:** Control of dust and gaseous air emissions from construction vehicles and equipment at all locations along the alignment where and when construction is underway and there is an exposed public.			
1. The contractor will prepare an air quality control plan as part of its SSEMP that incorporates use of the following measures:	Start of Project	Project-wide	Contractor
2. Remove spoil materials and excavated dirt quickly or stockpile away from trafficked areas; prevent wind from entraining particulate from stockpiles through watering or covering.	Duration of Project	Alignment and adjacent roadway areas	
3. Clean using dry methods exposed surfaces at or near work sites along the alignment, along haul routes and at other locations where dust is a problem.		Alignment and adjacent roadway areas; haul roads	
4. Maintain roadway surfaces adjacent to the ongoing work on the alignment to prevent the development of broken pavement and potholes			
5. Remove mud and windblown dust deposited on			

[29] This is used in preference to the typical arrangement in order to reduce the length of the table in the report.

Construction Mitigation Measures	Timing	Location	Responsibility
roadways at construction sites and haul routes			
6. Spray water at work sites and on unpaved surfaces within work spaces and fabrication yards		Alignment, roadways; haul roads; construction yards	
7. Cover and/or wet down materials onsite		Materials stockpiles along alignment; construction yards	
8. Cover loads during transport of loose sand, aggregate and spoil materials by truck		Roadways; haul roads; construction yards	
9. Provide washing facilities at the gates of casting yards and materials storage sites if necessary to remove mud from wheels and undercarriages	Start of Project	Construction yards	
10. Control dust emissions from concrete and asphalt batching plants using means described in the EIA	Duration of Project	Batching plant locations	
11. Maintain a minimum setback distance of 500 m from sensitive receptors (schools, hospitals, mosques, residential areas etc.) for batching plants	Duration of Project	Batching plant locations	
12. Provide certification that construction equipment brought onto the job complies with Pak-II exhaust emissions standards, and assure equipment is properly maintained.	Start of Project; update continuously	Project wide	
Implementation; by whom, when: The Contractor will prepare an air quality control plan in sufficient detail prior to start of construction, and will implement measures progressively[30] at jobsites to control dust and gaseous air pollutants.			
Monitoring; by whom, when: The CSC will review and approve the air quality control plan, and will inspect bi-monthly conditions at the jobsites for compliance with the ECS.			
B. Noise Abatement: Control of noise from construction vehicles and equipment at all locations along the alignment where construction is underway and there is an exposed public.			
1. The contractor will prepare a noise control plan as part of its SSEMP that incorporates use of the following measures:	Start of Project	Project-wide	Contractor
2. Use equipment with built in noise abatement, especially pavement breakers, crawler cranes, excavators and concrete cutters	Duration of Project	Alignment and adjacent roadway areas	
3. Construct temporary noise barriers between noisy activities and noise-sensitive receivers		Near sensitive receptors where excessive noise poses a risk	
4. Locate noisy equipment at construction sites and yards as far away as is practical from noise-sensitive sites	Start of Project	Construction yards	
5. Construct walled enclosures around especially noisy activities or clusters of noisy equipment	Duration of Project	Alignment; construction yards	
6. Combine noisy operations to occur in the same time period if possible			
7. Provide noise-dampened equipment, such as quieted and enclosed air compressors and properly working mufflers on all engines			

[30] "Progressively" as used in this table refers to cost-effective implementation in which less costly though still effective options may be applied initially, followed by more costly options if problems persist.

Construction Mitigation Measures	Timing	Location	Responsibility
8. All construction equipment and vehicles shall be well maintained, regularly inspected for noise emissions, and shall be fitted with appropriate noise suppression equipment consistent with applicable national and local regulations. Vehicles and equipment shall be registered and have necessary permits.		Project-wide	
9. Truck drivers and equipment operators shall minimize the use of horns.		Alignment; haul roads; construction yards	
10. Limit noisy construction-related activities during the night near sensitive receptors (e.g., hospitals and residential areas). Such activities should be restricted to daylight hours.		Alignment; construction yards	
11. Impose speed limits on construction vehicles to minimize noise emission along areas where sensitive receptors are located (residential areas, etc.).		Alignment; haul roads; construction yards	
12. Provide prior notification to the community on schedule of construction activities.	Periodically, when work commences in new area	Alignment	
Implementation; by whom, when: The Contractor will prepare a noise control plan in sufficient detail prior to start of construction, and will implement measures progressively at jobsites to control dust and gaseous air pollutants.			
Monitoring; by whom, when: The CSC will review and approve the noise control plan, and will inspect bi-monthly conditions at the jobsites for compliance with the ECS.			
C. Vibration: Identification of damage risk due to vibration, measurement and mitigation/ compensation			
1. The contractor will monitor vibration during the conduct of work if conditions indicate that damage to buildings could occur due to vibration inducing activities.	Duration of Project	Alignment and adjacent roadway areas	Contractor
2. The contractor is obligated to maintain vibration levels at the faces of buildings within the specified project criteria of 3 mm/sec PPV.			
3. The contractor will conduct pre- and post-condition surveys when conditions are present that might lead to building damage	When work starts; and after work has ended in an area	Newly occupied work areas	
4. If the criteria are exceeded, and damage occurs to buildings, the contractor is obligated to pay damage claims.	Once claims are verified	Project-wide	
Implementation; by whom, when: The Contractor will implement measures at jobsites where and when vibration damage risk is apparent.			
Monitoring; by whom, when: The CSC will assure vibration risk is accounted for via the established procedure.			
D. Traffic Management: maintaining the free flow of traffic in construction zones and along haul routes			
1. The contractor will prepare a Traffic Management Plan as part of its SSEMP that incorporates use of the following measures:	Start of Project	Project-wide	Contractor
2. The Contractor will prepare construction staging plans for each intersection, in order to maintain cross-flow of traffic during excavation of below-grade cuts.	Prior to start of work at a given intersection		
3. The Contractor will adhere to staging plans, provide overarching real-time supervision during implementation, and modify plans as necessary to maximize traffic flow.	During work at a given intersection		
4. The Contractor will monitor traffic flow continuously in order to troubleshoot problems.	Duration of Project	Alignment and adjacent	

Construction Mitigation Measures	Timing	Location	Responsibility
5. The Contractor will debottleneck traffic flow beforehand at key intersections by any of the following measures, to enhance the capacity of the Intersection:		roadway areas	
a. Reduce demand for space by promoting use of public transportation			
b. Develop temporary pullouts for buses to reduce stoppage in traffic lanes			
c. Restrict Qingqi rickshaws or three-wheelers from entering the main thoroughfare			
d. Restrict roadside parking and loading at locations where construction is underway and during peak traffic periods			
e. Provide diversions (where possible) of private and bus traffic around construction zones.			
6. Traffic police should be present during rush hours at sites of congested traffic.	Duration of Project	Alignment and adjacent roadway areas	KMC
7. The Contractor will station flagmen where work is underway in the line of traffic, at the start of construction, and points of vehicle access into the work site.	Duration of Project	Alignment and adjacent roadway areas	Contractor
8. The Contractor will keep operations within the workplace boundaries, to the extent possible.			
9. The Contractor will keep traffic lanes free of obstruction by removing excess spoil and debris.			
10. The Contractor will pay special attention to maintaining the free flow of traffic during rush hours and heavy daytime use.			
11. The Contractor will plan and clearly mark routes through urban areas for movement of over-weight/over-length (OW/OL) loads of heavy equipment and precast sections.	During transport of OW/OL loads	Along transport routes	
12. The Contractor will provide front and rear escort vehicles, equipped with flashing light, for movement of OW/OL vehicles, and auxiliary flagmen along the route and onboard to assure clearance.			
13. Movement of OW/OL loads preferably will be done at night.			
Implementation; by whom, when: The Contractor will prepare a traffic management plan pursuant to that prepared by the EPCM consultant that incorporates necessary detail on construction sequencing, and will implement traffic management measures progressively at jobsites to maintain traffic flow.			
Monitoring; by whom, when: The CSC will review and approve the traffic management plan, and will monitor its implementation at jobsites.			
E. Maintaining Community-use Values: overarching criteria aimed at maintaining the public's access to property, preventing inconvenience to the public, limiting public health impacts due to air pollution and noise, assuring safe and accident-free interface between ongoing construction work and the public.			
1. The Contractor will clearly barricade work areas to prevent access by the public, while ensuring passage by providing safe pathways for pedestrians around construction zones	Duration of Project	Alignment and adjacent roadway areas	Contractor
2. The Contractor will exclude parking, waiting vehicles and vendors from areas adjacent to the work by means of clearly marked barricades and posted signage.			
3. The Contractor will remove excavated earth, spoil, rubble, cut vegetation and refuse whether generated by the project or discarded by third parties from areas within the construction zone.			
4. Spoil will be removed daily from the construction zone where it has potential to interfere with the public or			

Construction Mitigation Measures	Timing	Location	Responsibility
generate dust.			
5. Any earth or material stockpiles in the construction zone will be covered or watered regularly to control dust; and shall not be left in place longer than a week before used in infilling, except as approved by the Supervising Engineer.			
6. The Contractor will place flagmen at the start of construction zones, at points where construction vehicles enter and exit the construction zone, and intersections along haul routes.			
7. The Contractor will provide clear, visible signage to communicate risks at the start and at regular points along the construction zone.			
8. The Contractor will provide temporary lighting along roadways and pedestrian walkways where lights have been removed to facilitate construction.			
9. The Contractor will remove hazardous conditions on construction sites that cannot be controlled effectively with site access restrictions; and will barricade any excavations and materials placed in public space.			
10. The Contractor will avoid blocking access to land, homes and businesses; where unavoidable, the Contractor will provide safe and effective temporary access to affected properties, and will reinstate permanent access on completion of work in the immediate area.			
11. The Contractor will promptly reinstate any services and reinstall any physical facilities that are cut, disconnected or damaged during construction, and maintain or provide temporary services that are interrupted by construction. The Supervising Engineer will inspect and certify the adequacy of all reinstated services and facilities.			
Implementation; by whom, when: The Contractor will implement these measures continuously at jobsites where there is public exposure.			
Monitoring; by whom, when: The CSC will monitor these bi-weekly using a checklist, over the duration of the project, through direct observation within the construction zone.			
F. HIV/AIDs Prevention: to limit the spread of HIV via workers at the jobsite and surrounding community.			
1. The Contractor will provide HIV screening for workers employed at the site.	Duration of Project	Project-wide	Contractor
2. The Contractor will provide HIV/AIDs education and awareness among workers through use of training sessions, videos and other appropriate means.	Periodically, for duration of project		
Implementation; by whom, when: The Contractor will implement these measures in keeping with its hiring schedule.			
Monitoring; by whom, when: The CSC will monitor these occasionally at the Contractor's office, by inspection of records.			
G. Occupational Health and Safety: maintenance of safe and healthy working conditions for the Contractor's labor force, in general, and at all locations where construction is underway.			
1. The Contractor will prepare an Occupational Safety and Health Plan that conforms to requirements set out in the EMP. The Contractor will hire a fulltime permanent safety officer and support staff as necessary to carry out the terms of the Plan.	Start of Project	Project-wide	Contractor
2. The Contractor will provide as a minimum safety training addressing 1) general safety awareness; 2) first aid procedures; 3) emergency procedures; and 4) use of personal protective equipment.	Duration of Project		

Construction Mitigation Measures	Timing	Location	Responsibility
3. The Contractor will conduct weekly site safety inspections and preparation of site safety reports in relation to the contract.	Duration of Project		
4. The Contractor will provide a system for recording all accidents and dangerous occurrences, regardless of whether or not personnel injury occurs, including any incident involving a member of the public.	Start of Project, in use over duration of project		
5. The Contractor will investigate accidents in order to ascertain the facts with a view to prevent future and possibly more serious occurrences.	Duration of Project		
6. The Contractor will collect accident data to show trends, identify how problems arise, and enable accident prevention efforts to target problem areas.	Duration of Project		
7. The Contractor's plan will include a Safety and Emergency Preparedness Plan to address foreseeable emergencies that may arise during the construction activity.	Start of Project		
8. The Contractor will display safety signage around the sites in both Urdu and English, to address use of PPE, dangerous conditions, smoking prohibition, first aid station, and prohibited entry.	Duration of Project		
9. The contractor will provide means for maintaining healthy working conditions for workers related to the effects of noise, dust, use of chemicals, by removal of the cause and use of suitable Personal Protective Equipment (PPE), to be provided to workers. The Contractor will ensure that workers are properly trained in the use of PPE and that adequate supervision is provided to ensure its proper use.	Duration of Project		
Worker Camps			
10. Provisions for workers should conform to requirements of the Sindh Occupational Safety and Health Bill (2017) and relevant standards of the International Labor Organization (ILO).	Duration of Project	Project-wide	Contractor
11. The Contractor is required to maintain accurate counts of workers living offsite and those housed at onsite facilities.			
12. The Contractor will provide and implement a plan for suitable housing for workers living onsite. Housing should meet ILO specifications in respect of the nature and standard of the accommodation and facilities to be made available.			
13. The Contractor will provide for those living onsite food preparation and sanitation facilities, potable water supply, common dining rooms, canteens, rest and recreation rooms and health facilities, and solid/liquid waste management in accordance with Sindh Government regulations and ILO standards.			
Implementation; by whom, when: The Contractor will prepare the Occupational Safety and Health Plan in sufficient detail prior to start of construction, and will implement measures progressively at jobsites to assure safe and accident free operations.			
Monitoring; by whom, when: The CSC will review and approve the Occupational Safety and Health Plan, and will inspect bi-weekly conditions at the jobsites for compliance with the ECS.			
H. Water Use, Quality and Drainage: to assure minimum impact on water resources, or impact from uncontrolled drainage and contamination, or degradation of drainage facilities from sediment.			
1. The Contractor will need to factor the cost of water for water spraying into its bid price, and curtail use by maintaining site cleanliness, in order to control dust by means other than the use of water.	Start of Project	Project-wide	Contractor
2. At the start of construction, a Site-Specific Drainage Management Plan for construction sites, construction	Start of Project	Project-wide	Contractor

Construction Mitigation Measures	Timing	Location	Responsibility
yards, materials storage areas and administration/worker housing shall be developed by the Contractor as part of its SSEMP. The Plan shall address the impacts and mitigation measures described in EIA, and be approved by the Supervising Engineer.			
3. Discharge of waste water into water bodies is prohibited as is the discharge of wash water from concrete trucks to waterways.	Duration of Project	Alignment, adjacent areas, depot sites	Contractor
4. Concentrated solids will not be washed into receiving drainage structures or open channels.	DO		
5. Sediment and fine debris will be removed as solids by cleaning/scraping work areas and removing piles of debris in a solid form, in order to prevent sediment loss to drainage channels.	DO		
6. Portable sanitation facilities will be set up at construction sites and regularly cleaned by vacuum truck.	DO		
Temporary Construction Yards			
7. Construction yards and material storage areas where vehicles operate or materials are stored should be established on well drained fill.	Included in Drainage Plan	Construction yards	Contractor
8. Free-flowing points of discharge for storm water should be identified nearby the boundaries of materials storage/construction yards for gravity or pump-assisted dewatering and yard drainage.			
9. Local drainage channels should have sufficient capacity for handling discharge flows, with clear discharge points to open drainage courses.			
10. Water discharged to constructed drains should contain a minimum quantity of suspended solids.			
11. Temporary worker quarters and erection yards should include self-contained waste treatment with removal of excess by vacuum truck or approved discharge point.			
12. Drainage from fuel storage tank locations, refueling areas, and equipment service areas should be segregated from other runoff; discharge should be routed through an oil/water separator.			
13. Fuel storage tanks should be surrounded by secondary containment equal to at least half the volume of the tanks with impervious flooring.			
14. The contractor will monitor total suspended solids (TSS) of outfalls from construction sites where these discharge to local drainage channels, and comply with a limit of 200 mg/L TSS.			
Implementation; by whom, when: The Contractor will prepare the Site-Specific Drainage Management Plan in sufficient detail prior to start of construction, and will implement measures at jobsites to maintain good drainage and prevent degradation of water resources.			
Monitoring; by whom, when: The CSC will review and approve the Site-Specific Drainage Management Plan, and will inspect bi-weekly conditions at the jobsites for compliance with the ECS.			
I. Solid Wastes and Hazardous Materials: to assure safe, efficient handling, storage and disposal of solid and hazardous wastes.			
General			
1. Contractors are required to prepare a Spoil and Solid Waste Disposal Plan (SSWDP) that identifies the following: material types, estimated quantities and methods for disposal; locations onsite for collection and storage; locations for disposal. A recordkeeping system for all wastes and a tracking and manifest	Start of Project	Project-wide	Contractor

Construction Mitigation Measures	Timing	Location	Responsibility
system for hazardous and recycled materials will be included in the plan. Necessary enclosed facilities, containers and equipment will be provided in keeping with the Plan. The Plan should be updated as necessary with actual quantities, locations for disposal and additional information in accordance with the Plan.			
2. Waste will be segregated in recordkeeping and physically, at construction sites, into the following general categories: spoil, construction debris and drilling mud/cuttings (Class C non-putrescible wastes); trash and other forms of degradable but non-hazardous wastes (Class B); hazardous wastes and spent materials, including liquids (Class A); materials determined to be recyclable with identified takers (Class R).[31]	Duration of Project	Work sites, construction yards	
3. Class A waste material containers will be stored on a raised platform in dry condition for no longer than one week unless kept in an enclosed and secured location, in which storage of up to 3 mo is allowed.			
4. The Contractor will promptly collect, store, transport and dispose of Class B solid waste generated at the project site. No solid wastes will be allowed uncollected at the jobsite or accumulated in storage for periods in excess of a month. Transport and disposal will be by recognized means approved by the Engineer.			
5. Class C spoil materials, cuttings and wastage from the site that are unsuitable for use in construction shall be disposed of at locations specified in the SSWDP and approved by the Engineer. Methods of placement and compaction, and limits on the types of materials to be placed therein are subject to prior review and approval by the Engineer.			
6. Deposition of spoil materials shall be approved where clear land titles are in place, in areas designated as suitable for fill, and in line with guidance provide by the Supervision Engineer and the Local Government Agency. In no case shall spoil materials be placed in or near rivers, drainage channels, lakes and other forms of permanent wetland.		Disposal areas	
7. Class R recyclables may be stockpiled for up to one month while identifying a taker; otherwise the materials will be treated as a waste product and removed from the site.		Work sites, construction yards	
8. Material Safety Data Sheets (MSDS) for purchased chemical additives, reagents and compounds will be kept at the work site.			
9. Maintain trash receptacles at construction sites, and designate areas for stockpiling used/discarded materials temporarily.			
10. The Contractor will handle and dispose of, or recycle, unused and spent hazardous materials at an SEPA approved and licensed facility, to prevent losses to the environment.			
Alignment			
11. Quantities of spoil, construction debris and drilling mud/cuttings will be estimated beforehand, and locations for disposal identified and agreed with the	Duration of Project	Work sites along alignment	Contractor

[31] These classes are solely for use on the KBRT project, and are not intended to reflect broader Government policy.

Construction Mitigation Measures	Timing	Location	Responsibility
Superintending Engineer.			
12. Solid waste, trash, broken forms and equipment parts, waste oil, and oil-soaked rags, soil and absorbent will not be disposed of along with earth spoil.		Spoil disposal locations	
13. Vegetation (trees, branches etc.) cut or removed from the alignment during construction will not be allowed to remain stockpiled at the worksite, and will be disposed of or put to proper use immediately upon cutting.		Work sites along alignment	
14. No waste materials will be stored along the alignment for periods longer than one day. The Contractor will prohibit materials being discarded by others along the alignment during the period of construction; it will be the responsibility of the contractor to dispose of properly any such materials so placed.			
15. The Contractor will assure that used materials, debris and solid waste are removed daily from construction sites along the alignment, and that no such material is allowed to accumulate onsite, or to interfere with the passage of traffic or construction work.			
Implementation; by whom, when: The Contractor will prepare a Spoil and Solid Waste Disposal Plan in sufficient detail prior to start of construction, and will implement measures at jobsites to assure the correct storage, handling and disposal of waste.			
Monitoring; by whom, when: The CSC will review and approve the Spoil and Solid Waste Disposal Plan, and will inspect bi-weekly conditions at the jobsites for compliance with the ECS.			
J. Archeological Remains: to protect and otherwise preserve any discovered remains of ancient origin that may be unearthed at the jobsites.			
1. The Contractor is required to stop construction on discovery of objects of archaeological origin and institute the chance find procedure described in Appendix F of the EIA.	Duration of Project	Work sites along alignment	Contractor
2. The Contractor will familiarize equipment operators and laborers of the requirement.			
Implementation; by whom, when: The Contractor will implement the measures initially, through training, and over the duration of the project, by being attentive to conditions during excavation.			
Monitoring; by whom, when: The CSC will monitor occasionally to maintain assurance that the Contractor is following the requirement.			
K. Tree Removal and replanting: to systematize the removal of trees in the way of construction, pay adequate compensation, and assure adequate replacement in the way of trees replanted.			
1. The Contractor will follow the formalized procedure for tree removal outlined in the EIA.	Duration of Project	Work sites along alignment	Contractor
2. The contractor will be required to inventory trees before cutting, resolve any difference with the tree count provided by the consultant, and request permission on a batch-wise basis from the CSC for cutting trees.			
3. If the cut materials cannot be disposed of otherwise, the Contractor is required to deal with the vegetation as a Class B solid waste.			
4. Trees will be planted as an offset measure to compensate for those cut according to the Government guidelines (5 planted for every single tree cut) at locations specified in the plans.			
Implementation; by whom, when: The Contractor will implement the measures continuously during removal of trees.			
Monitoring; by whom, when: The CSC will track and maintain records for the batch-wise removal of trees, disposition of cut materials, payment of compensation, and planting of offset trees over the duration of the project.			

Construction Mitigation Measures	Timing	Location	Responsibility
L. <u>Public Infrastructure and Utilities:</u> to provide for the relocation and/or protection of utility infrastructure.			
1. The Contractor will prepare a specific Utilities and Telecommunications Relocation Plan as part of its SSEMP to address any additional relocation requirements for power and utilities, and means for protection of utility infrastructure during construction.	Start of Project	Project-wide	Contractor
2. The Contractor will produce maps and drawings indicating a thorough understanding of utilities in the way of construction.			
3. The Contractor will show a record of consultation with utility providers to reconfirm that utilities have been effectively relocated, and the extent to which remaining infrastructure may be damaged or disrupted.		Alignment	
4. The Contractor will demonstrate a knowledge of activities undertaken up to the start of construction to relocate utilities.			
5. The Contractor will describe means for protecting any utilities that may be potentially disrupted or damaged.			
6. The Contractor's SSEMP will contain contact focal points in all relevant utilities and local authorities in the event of additional relocation requirements or damage/disruption.			
7. The Contractor's SSEMP will contain contact information in the local community in case of service interruption.			
8. The Contractor's SSEMP will contain an emergency response plan including provisions and action plan for immediate repairs to damaged utilities, in order to restore service in the shortest time possible.			
9. The Contractor will coordinate relocation of remaining utilities ahead of construction works with the relevant utility company.	Duration of Project		
10. The Contractor shall in no instance excavate around or over live buried electrical cable, pressurized gas lines or water lines during the construction, or allow such to be suspended across open excavations in a manner that, in the opinion of the Resident Engineer, threatens public or worker safety.			
<u>Implementation; by whom, when:</u> The Contractor will prepare a Utilities and Telecommunications Relocation Plan in sufficient detail prior to start of construction, and will implement measures at jobsites to assure that utilities are out of the way of construction, or otherwise protected from damage.			
<u>Monitoring; by whom, when:</u> The CSC will review and approve the Utilities and Telecommunications Relocation Plan, and will inspect conditions prior to the start of work at any jobsite for accounting of utilities.			

Costs associated with Mitigation Measures

575. Costs associated with these measures for the most part are borne by the Contractor as part of its general overhead, and in general are included as a factor in the unit price bid for items in the bill of quantities. Costs have been estimated for each of the major divisions of activity as shown in Table 7-5.

576. These costs are only approximate, incorporating as they do many uncertainties. Some will be included as pay items in the bill of quantities, for example, tree planting and unclassified excavation and spoil disposal. Others may be included as provisional sums, for instance road repair, to be activated at the request of the CSC acting for the PIU. Included also are staffing costs related to the EMO and H&S Officer, both budgeted for Rs 80,000/mo for 24 mos. Other

staffing costs, primarily for support staff addressing environment, health and safety are not included, but will need to be borne by the Contractor.

Table 7-5: Summary of Environmental Costs related to Construction

	Environmental Parameter		Million Rs
A	Air Quality		3.42
B	Noise Abatement		0.82
C	Vibration		0.08
D	Traffic Management		1.2
E	Maintaining Community-use Values		1.3
F	HIV/AIDs Prevention		0.3
G	Occupational Health and Safety		3.78
H	Water Use, Quality and Drainage		1.52
I	Solid Wastes and Hazardous Materials		4.64
J	Archeological Remains		0
K	Tree Removal and replanting		2.1
L	Public Infrastructure and Utilities		0.14
		Subtotal	19.3
	Contractor Staffing Costs (based on two contractors)		
A	Environmental Management Officer		3.84
B	Health and Safety Officer		3.84
C	Community liaison officer & Human Resource Officer		2.4
D	Doctor		3.6
		Subtotal	13.68
		TOTAL	**32.98**

7.5.4 Operations

577. Table 7-6 lists mitigation measures for the operations phase. Bus operators and the ITS Systems operations contractor are generally responsible for these measures, supported by SMTA, the KMC and other agencies. Much work needs to be done to develop a system of environmental management within SMTA, and to insure environmental protection measures are incorporated into the operations contracts.

Table 7-6: Environmental Mitigation Measures during Operations

Responsibility: SMTA
Noise and Vibration
Assure that operators establish and conform to a maintenance and inspection schedule for rolling stock (buses).
Maintain dense vegetation in green areas near driving lanes and stations to dampen noise levels.
Traffic Management
Establish traffic management measures to maintain traffic flow in the vicinity of stations.
Prohibit Qinzhi access on main roads, but SMTA working with KMC will develop and promote use of intermodal transport on side roads near stations.
Assure that sidewalks that connect to points of access and egress are kept in good repair.
Transport connectivity will be provided by access points for other forms of public transport.
Drainage and Water Quality
Waste treatment systems at depot and other operations areas will be operated to obtain consistent high-quality effluent.
Discharge points will be monitored to assure compliance with SEQS.
Solid Waste and Hazardous Materials
Depot
The Depot operator will institute a Waste Management System taking into account materials to be disposed of

Responsibility: SMTA
and recycled, estimated quantities and methods for collection, storage, treatment and disposal or recycling. A recordkeeping system will account for all wastes and recycled materials, and length of time and locations for storage; a tracking and manifest system for hazardous and recycled materials will be maintained.
The site design and equipment procurement will provide necessary enclosed facilities, containers and equipment for managing wastes.
The Depot operator will dispose of spent hazardous materials and wastes by means and at locations acceptable to the SEPA.
The Depot operator will not store hazardous and recyclable materials indefinitely at the site, as this is a hidden liability for the owner. No waste material should remain in storage for more than a month.
The Depot operator will develop recycling systems and linkages for metal scrap and for waste oil, and will inspect uses and processing beforehand to assure environmental soundness.
Material Safety Data Sheets (MSDS) for purchased chemicals, reagents and compounds will be kept current and readily accessible for use.
Operator will maintain onsite wastewater collection system in good operating condition.
Operator will implement safety and health programs to assure accident free and healthy environment
Stations
SMTA will coordinate with KMC for an improved level of maintenance of solid waste in the vicinity of stations.
SMTA will assure that station waste receptacles are available and kept in good condition, emptied regularly, and maintenance is periodically performed on the equipment.
SMTA will maintain the area around stations free of trash and refuse; post signs against littering.
Public Infrastructure
KMC and SMTA will identify and share responsibilities for maintenance of solid waste, public toilets and walkways in the vicinity of stations, and resolve cost sharing arrangements.
Vegetation and Wildlife
SMTA working with local authorities will undertake a tree replanting program along the alignment, assure trees are maintained and watered until growth is established.
Risk
SMTA will train in emergency response procedures before operations begin by staging drills and assuring physical features are in place (signage etc.).

Costs

578. Estimated operations and maintenance costs are shown in Table 7-7. These costs are likely to be spread among the various operations contractors.

Table 7-7: Summary of EMP Recurring Costs during Operations

Operations Activities (SMTA)		Annual Cost Million Rs
Noise and Vibration		0.4
Traffic Management		0.35
Drainage and Water Quality		0.7
Solid waste / Hazmat		0
Depot		1.2
Stations		0.6
Public Infrastructure		0.4
Vegetation and Wildlife		0.7
Risk		0.2
	Subtotal	4.55
Superintending Sanitation Officer		0.96
Superintending H&S Officer		0.96
	Subtotal	1.92
	TOTAL	6.47

7.6 Project Environmental Monitoring

7.6.1 Summary of Project Standards

7.6.1.1 Ambient Air Quality (SEQ Standard, µg/cu m)

Table 7-8 Ambient Air Quality (SEQ Standard, µg/cu m)

Pollutant	Time-weighted Average	Concentration in Ambient Air	Method of Measurement
Sulphur Dioxide (SO_2)	Annual Average	80 µg/m^3	Ultraviolet fluorescence method
	24 hrs	120 µg/m^3	
Oxides of Nitrogen (as NO)	Annual Average	40 µg/m^3	Gas phase chemiluminescence
	24 hrs	40 µg/m^3	
Oxides of Nitrogen (as NO_2)	Annual Average	40 µg/m^3	Gas phase chemiluminescence
	24 hrs	80 µg/m^3	
O_3	One hr	130 µg/m^3	Non-dispersive UV absorption
Suspended Particulate Matter (SPM)	Annual Average	360 µg/m^3	High Volume sampling
	24 hrs	500 µg/m^3	
Respirable Particulate Matter (PM_{10})	Annual Average	120 µg/m^3	B ray absorption
	24 hrs	150 µg/m^3	
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average	40 µg/m^3	β ray absorption
	24 hrs	75 µg/m^3	
Lead (PB)	Annual Average	1 µg/m^3	AAS method
	24 hrs	1.5 µg/m^3	
Carbon Monoxide (CO)	8 hrs	5 mg/m^3	Non-dispersive infrared method
	1 hr	10 mg/m^3	

7.6.1.2 Drainage discharges (SEQ Standard)

579. Total suspended solids content will be limited to 200 mg/L (ECR Schedule – 9: Standards for Sewage Discharge). Discharge of water contaminated with organic waste or chemicals is prohibited.

7.6.1.3 Ambient Noise Limits (SEQ Standard)

Table 7-9 Ambient Noise Limits (SEQ Standard)

S.N.	Category of Area/Zone	Limit in dBA (Leq)	
		Day	Night
1	Residential Area (A)	55	45
	Commercial Area (B)	65	55
	Industrial Area (C)	75	65
	Silence Zone (D)	50	45

Notes: Evaluation point is at boundary of buildings
Daytime: 6:00-22:00, Night time: 22:00-6:00
Silence zones: hospitals, educational institutions, places of religious worship and courts

7.6.1.4 Non-road and heavy Truck Exhaust Emissions Standards

580. Construction equipment brought onto the job will comply with SEQ exhaust emissions standards (g/KWH):

Ref.	Category	CO	HC	NOx	PM
PAK-II	HDDE	4.0	1.1	7.0	0.15

7.6.1.5 Vibration (Project Standard)

581. 90 VdB, approximately corresponding to 3 mm/s PPV, measured at building face

7.6.2 Air, Water and Noise Monitoring during Construction

582. The Contractor is expected to conduct and hire for sampling and analysis of environmental parameters during construction, done both 'in-house' and by an Independent Monitoring Group (IMG). In both cases data will be passed on to the PIU and CSC, and included in monthly reporting by the Contractor, and summarized in the PIU quarterly report to ADB, prepared by the CSC.

In-house Monitoring

583. In-house monitoring will be conducted by the contractor on a regular basis to identify problems associated with compliance with environmental standards or to investigate public complaint. The type of monitoring is referred to as surveillance monitoring and is done on presumption of exceedance and to identify causes, in an investigative mode.

Air Quality

584. Typically, dust conditions, or concentrations of gaseous pollutants (due to numbers of equipment working within a limited space) can approach acceptable limits or impede respiration for those in the vicinity, or cause irritation to eyes (either through direct impact from dust on those traveling in open vehicles, or from irritating properties of gases). The Contractor on its own volition or in response to direct request from the CSC field inspector (environmental inspector for the CSC) will conduct air sampling and analysis in the vicinity of work to determine if ambient limits are being exceeded. The Contractor will perform sampling and analysis as necessary to establish need for mitigation.

585. The Contractor will implement mitigation measures to control dust and gaseous emissions and periodically sample and analyze air quality to bring pollutant levels in line with SEPA ambient limits.

586. The Contractor will maintain records of air quality monitoring, providing evidence in monthly reporting to the CSC.

Noise

587. Noise levels will be kept within the limits specified by the project standard, as measured at the face of the nearest building, or at the boundary of the construction zone, taking into account the predominant land use and the time of day. The Contractor should routinely measure, record and report Leq-10 min values (dBA) along the boundary of the construction zone. using a Class I-

type noise meter[32] If indication of exceedance is found, conditions and circumstances should be noted and progressive measures put into place to reduce noise levels. The Contractor will maintain records of noise, date time and place, and provide evidence in monthly reporting to the CSC.

588. The Contractor will measure compliance with the Sindh SEQ Regulation for motor vehicle noise (2016) of 85 dBA measured at 7.5 m from the source, and report monitoring results in monthly reports.

Vibration

589. Evidence of excessive vibration in the form of types of equipment usage, observation or public compliant requires the contractor to perform vibration monitoring at the face of the nearest building, at the boundary of the construction zone, or at 50 m from the vibration source, whichever is less. Actual protocol for vibration monitoring will be submitted for approval by the CSC. Depending on the results of vibration monitoring and potential for damage, additional monitoring may be required, as well as pre- and post-condition surveys of nearby buildings and measures to mitigate impact.

590. Conditions producing excessive vibration will be noted along with measured results, recorded and reported in monthly reports to the CSC. Measurements will be performed across the full low-frequency spectrum typical of ground vibrations induced by construction equipment.

Water Quality and Drainage

591. Site drainage will be sampled and analyzed on a frequent basis wherever it occurs, either weekly in the case of continuous flows, or in the event of discharge for discontinuous flow. Sediment content will be kept within the SEQ limit of 200 mg-TSS/L using the variety of means described in the EIA. Simplified means of monitoring may be proposed, for instance, turbidity in lieu of TSS by gravimetric means, so long as a logical relationship is established.

592. Discharges of wastewater (sanitary wastes, kitchen wastes, and drainage from contaminated areas, machine washing, or other forms of wastewater) will be sampled and analyzed at least monthly, or at the time of discharge, and kept within the limits specified in the Sindh EQS for municipal and liquid industrial effluents published in the Sindh Government Gazette on 28 Jan 2016.

Independent Monitoring

593. The Contractor will provide independent monitoring of air, water and noise on a quarterly basis in the vicinity of construction sites. Sampling and analysis will be performed by an Independent Monitoring Group (IMG), such as SUPARCO or an equivalent organization subject to prior approval by the Engineer. The locations, frequency and timing, numbers of samples and parameters will be specified beforehand and subject to the approval of the engineer. The IMG will report results of periodic monitoring directly to the Engineer and the Contractor. The data will

[32] A **Class 1 Sound** Level **Meter** is a **noise** measurement instrument that meets the requirements of IEC 61672-**1**:2002 (or an equivalent such as BS EN 61672-**1**:2003) to **Class 1** performance.

be used to assess progress in implementing the SSEMP. Vibration monitoring will be required in special cases.

594. The Contractor will provide in its SSEMP a plan and schedule, including locations, frequencies and parameters, for monitoring air and water quality, and noise levels, at the boundary of sites and along the alignment, subject to the approval of the Engineer. In general, the following will be met:

595. Air quality: sample air quality over two consecutive twelve-hour periods and analyze for suspended particulate matter (SPM) and PM10, oxides of nitrogen (NOx), sulphur dioxide (SO2) and carbon monoxide (CO); once per quarter-annum, at sufficient downwind locations near the perimeter of work sites. An investigative program as described for in-house monitoring will be required of the contractor in the event there are complaints concerning air quality from the community, which will require more frequent monitoring to determine causes.

596. Water quality: Obtain samples from drains at pre-agreed locations near work areas each quarter-annum for measurement of Total Suspended Solids (TSS) using grab samples. Locations for monitoring will be identified and agreed with the contractor. Monitor and analyze quality of drinking water sources for the labor force at least every six months, or upon renewal of a source of drinking water, unless bottled water is provided from an approved supplier.

597. Noise: obtain one-minute noise level readings (dBA) for a period of one hour during typical operations; and report maximum Leq – 10 min; once per quarter-annum; at predetermined locations around the perimeter of the site.

598. In summary, overarching parameters will be monitored through inspection by the Contractor's EMO, along with the CSC Environmental Officer, to cover the scope of potential impacts and mitigation measures described in this chapter related to construction, which are summarize in Table 7-8.

Table 7-10: 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 excess noise and need for noise abatement	Ambient noise level near key receptors along project corridor	A-weighted noise levels – Leq one-hr over 24 hr period	At sensitive receptor locations along the project corridor adjacent to ongoing work	Bi- weekly or as needed to determine impact	Contractor's EMO, CSC EO
Air Quality Fugitive dust and air emissions from equipment	To identify air quality problems in vicinity of work site	SPM, PM_{10}, $PM_{2.5}$, CO, NO_x	According to SEQS standards	At locations along the project corridor adjaccent to ongoing work	Bi- weekly	Contractor's EMO, CSC EO

Project Activity and Potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
		Visible dust	Visual observation of size of haze, dust on roadways, accumulation on surfaces	Construction sites	Once daily	Contractor's EMO, CSC EO
Vibration Excess vibration leading to damage and annoyance	To limit vibration impacts along alignment during construction	Peak Particle Velocity	Direct measurement	At face of nearest building adjacnet to use of vibration enducing equipment	Bi- weekly	Contractor's EMO, CSC EO
Water use/drainage Wastage, sediment loss, pollution in storm water system	Avoid sediment and pollution load in streams, water wastage	Volume of water used, site drainage, sediment loss, contamination	Visual observations at project sites and at labor camps	Construction sites and labor camps	Once daily	Contractor's EMO, CSC EO
		Effluent parameters for any wastewater outfalls	BOD, TSS, pH	At outfall locations from waste treatment systems	Monthly	Contractor's EMO, CSC EO
Traffic	To minimize traffic congestion near work areas	Traffic conditions; effectiveness of traffic management plan	Visual monitoring	Construction sites along BRT corridor	Daily	Contractor's EMO, CSC EO
Solid Waste and Hazardous Materials Collection, storage, transportation and disposal	To insure efficient management and loss prevention	Inspect solid waste segregation, storage, recycling and disposal; proper storage/handling of hazardous materials and fuels	Visual inspections	At labor camps and at work sites along project corridor	Once daily.	Contractor's EMO, CSC EO
Occupational Health and Safety Accidents and health risk	To prevent accidents and risks to health for workers	Number of near miss events and accidents taking place	Visual inspections Accident records; other records	Construction sites along BRT corridor	Once weekly	Contractor's EMO, CSC EO
Community Health and Safety Accident, injury, inconvenience, delay, loss of income	To prevent loss within the community during construction of the project	Access, signage, levels of congestion, blockage	Visual inspections, dialogue with local people	Construction sites along BRT corridor	Daily	Contractor's EMO, CSC EO

Reporting

599. The Contractor will include in its SSEMP a proposal for monthly reporting on all aspects of environmental protection, including reporting the results of in-house monitoring. IMG monitoring

data will be included in monthly reports as and when data are available (generally the end of the calendar quarter).

Costs

600. Costs for air, noise and water quality monitoring during construction are included in the contractor's construction cost bid estimate. Total cost depends on the duration of the contract, number of samples taken and locations. Periodic monitoring during construction is estimated at 40.8 Lakh Rs annually, as shown in Table 7-11.

Table 7-11: Estimated Cost for Construction Phase Monitoring

	No. samples		Annual cost
In-house Monitoring	per qrtr	unit cost	(Million Rs)
Air Quality	10	40,000	1.6
Noise			0.09
Vibration	10	5,000	0.20
Water Quality and Drainage			
Sediment	5	10,000	0.2
Wastewater	5	35,000	0.7
Independent Monitoring			
Air Quality	5	50,000	1.0
Water Quality	3	35,000	0.42
Noise	8	15,000	0.48
Fire Fighting and Ambulance			3.69
Generators & Construction Machinery Stack Monitoring			0.5
		Subtotal	**8.8**

7.6.3 Operations Phase Monitoring

601. Table 7-12 summarizes the proposed operations phase monitoring and Table 7-13 provides a general budget for costs of the monitoring.

Table 7-12: Operation 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 excess noise and need for noise abatement	Ambient noise level near key receptors along project corridor	A-weighted noise levels – Leq one-hr over 24 hr period	At 5 preestablished locations along the project corridor	Once per month	O&M Contractor's Environmental officer
Air Quality Adverse effects on human health	To monitor long term trends in AQ along alignment	SPM, PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2	Concentrations per SEQS standards	At 5 preestablished locations along the project corridor	Once per month	O&M Contractor's Environmental officer

Project Activity and Potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Wastewater Effluent from depots impact on local environment	To ensure open waters are not affected by effluent	Effluent parameters for any wastewater outfalls	BOD, TSS, pH, phenols, and other parameters as appropriate	Depots at point of discharge	Once every six months	O&M Contractor's Environmental officer
Hazardous materials Hazardous materials can harm human health / environment	To ensure proper management of hazardous material	Overall management system for hazardous materials and waste	Complete record of purchase, storage, use, and disposal of hazardous material	At site of hazardous material use, storage and disposal	Quarterly inspections	O&M Contractor's Environmental officer
Solid Waste Management Improper handling and disposal is an inconvenience and public health hazard	To ensure solid waste is disposed of in an environmentally friendly manner	Overall management system for solid waste	Visual inspection; record keeping, on- and off-site audits	BRT stations, buses, depots and workshops	Quarterly inspections	O&M Contractor's Environmental officer

Table 7-13: Proposed Operations Phase Monitoring and Costs

Monitoring Component	Parameters	Quantity	Details	Amount Rs
Air Quality	CO, NOx, SO_2 PM_{10}	60 (Once a month at i.e 12 /yearr 5 locations)	60 readings @ Rs 50,000 per sample	2.43
Noise Levels	dB(A)	60 (Once a month i.e 12 / year 5 locations)	60 readings @ Rs 12,000 per reading	0.72
				Liquid Effluents
Effluent produced from depots and workshop areas	As per SEQS	8 (2 / year at 4 locations)	8 readings @ Rs 35,000 per reading	0.3
		Total		**3.45**

7.7 Capacity Building

7.7.1 Capacity Building Program

602. The ADB Phase II EPCM TOR calls for the consultant to "provide training to contractors and PIU personnel for environmental management and monitoring during construction and operation." The environmental assessment process In Sindh is well-established but environmental awareness and implementation capacity for infrastructure projects are limited for both the GOS executing agency and the implementation agency (TMTD). TMTD has no officer that is delegated to perform environmental duties on a regular basis, nor is it clear if any officers will be delegated responsibility over environment before or during conduct of the construction work for KBRT Project. Currently any engineering officer who might be delegated to check environmental assessments prepared by consultants would not have the capacity check the adequacy of the EMP, which is typically referred to SEPA for approval. TMTD is not directly involved with project implementation, given its largely administrative responsibility. Nationwide, environmental responsibilities devolve to SEPA.

603. Application of the EMP will be the responsibility of the CSC, supported by environmental and social safeguards consultants. It is recommended that an Environmental and Social Safeguard Unit (ESSU) be formed to serve as a robust environmental management unit for the BRT with permanent dedicated staff trained in environmental engineering and environmental management. The ESSU could be developed to improve overall environmental capacity in the SMTA. The developed ESSU could work with various PIUs as required and respond to growing national and international environmental concerns that will face the GOS in the medium and long term.

604. Training workshops should be conducted by the CSC at the outset of the works, with refresher courses as needed in keeping with Project performance. Training workshops should be conducted periodically by the CSC as new contractors are engaged, perhaps every six months, to share implementation experience results of monitoring, and lessons learned.

605. Table 7-14 shows an indicative schedule for capacity building activity to be conducted by CSC for PIU staff and contractors. Training should be conducted when there are interested participants and substantive information to be imparted, and should be organized on a demand basis with these criteria in mind.

Table 7-14: Indicative Capacity Building Program for TMTD and other Project Staff

Program	Description	Participants	Form of Training	Duration	Trainer/ Agency
Introduction and sensitization to environment issues	Environmental impacts of BRT system. Government and ADB regulations; interdepartmental coordination for environmental issues	TMTD management, officials responsible for implementing project, and other PIU/CSC staff as interested	Workshop	One-day workshop Preconstruction	CSC Environmental Specialist (International)
Pre-project training on hazards, health, safety and environmental issues pertaining to the project	Training for engineering and management professionals, to be involved in on-site execution and operation of the proposed facilities.	PIU management team	Workshops, site visits	Three days, preconstruction	Tailor-made training programs by Industrial safety NGO in Pakistan or Engineering Staff college (International)
EMP implementation	Implementation of EMP; impacts and mitigation; monitoring and reporting; public interactions and consultation	PIU staff, contractor staff and officials responsible for implementing project	Lectures and field visit	Two-day session, Construction stage	CSC Environmental Specialist (International)
Training on environmental management, OHS systems, emergency and risk response systems	Guidance for conformance to environmental management systems	TMTD engineers, officials responsible for implementing project, and other PIU/CSC staff	Lectures	Four-day program, lectures, site visits	Tailor-made training programs by Industrial safety NGO in Pakistan or Engineering Staff college (International)

7.7.2 Costs associated with Capacity Building

606. “The capacity building program is estimated to cost a total of 0.6 Lk Rs, to cover seminars amd training sessions at pre-construction and construction phases”.

7.8 Summary of Costs

607. Costs associated with implementation of the EMP are described in previous sections. These amounts are summarized in Table 7-15. Total one-time-only costs are million 57.59 and are incurred during construction. Most of these costs are included in the construction contract price. Training costs are generally included in and borne by the EPCM consulting contract. Not included in this estimate are costs associated with environmental design aspects. These costs have not yet been estimated; the actual cost will be seen as part of the contract bid price for the civil works, or mechanical equipment packages.

608. Annually recurring costs are Lk Rs 103.7 per annum, and are associated with monitoring during construction (included as part of the contractor’s bid price), and costs borne by SMTA for monitoring, or the operational costs borne by the bus operations providers.

Table 7-15: Summary of EMP Costs (Million Rs) for One Year

Costs	Million Rs
Environmental Aspects of Design	[Not yet Determined]
Construction mitigation measures	32.98
Training (preconstruction and construction phases)	0.6
Sub Total one-time-only costs (A)	33.58
Construction monitoring (annual)	8.8
Operations (annual cost)	6.47
Operations monitoring (annual)	3.4
Sub Total Annual Costs (B)	18.67
Total Cost one Time only (A+B)	52.25
Contingency Cost 10%	5.23
Total Cost	57.59

Table 7-16: Summary of EMP Costs (Million Rs) for 18 Months

Costs	Million Rs
Total Cost one for 18 Months	78.54
Contingency Cost 10%	7.84
Total Cost	86.38

609. Costs presented herein are highly generalized and should not be used to set ceilings for environmental mitigation and monitoring expense.

8. Consultation, Disclosure and Grievance Mechanism

8.1 Stakeholder Analysis

610. Stakeholder refers to individuals and institutions with an interest or 'stake' in the project. These 'juridical' entities may be able to assist in implementing the project, and are thus enjoined. The entity may have its own constituency as a user of the system, or find itself affected during the process of building the system. Entities may be representatives of the public-at-large, which may benefit, or be adversely affected, by the project, and thus are custodians of the public trust. In more concrete terms, stakeholders for the Karachi BRT Red Line project consist of:

- Utility and telecommunications companies (interference/damage to infrastructure)
- Academic/educational institutions
- Religious institutions and occupied space (mosques)
- Non-governmental/community organizations (representatives of the public trust)
- Local, provincial and national government agencies (representatives of the public trust)
- Non-formal, unorganized stakeholders, including shop owners, employees, local residents and daytime users of the area, including commuters.

Outreach has been accomplished in various ways as described in the following sections.

8.2 Overall Scope of Public Consultation described in this Chapter

611. Sequential, parallel and comprehensive stakeholder involvement has and will continue to take place through public consultation, focus group discussion, targeted meetings, and other forms of interaction.

Parallel activities

612. The Project Management, Coordination and Capacity Building (PMCCB) component of the Project Design Advance (PDA) contains two relevant foci: The Project Communication Plan (PCP); and the Community Awareness and Participation Program (CAPP). PCP contains numerous important aspects that are typically found in a "public relations" portfolio:

- Media Relations
- News Bureau (releases and FAQs)
- Government Relations
- Project Website
- Promotional Video
- Social Media
- System name and branding

613. CAPP involves engagement and consultation with key stakeholders from national and local government, advocacy groups and community organizations (mosques, schools, universities and

trade associations). It involves arranging focus groups and public meetings, based on customer awareness and outreach. The CAPP activity held a series of public consultations from 22 – 28 Feb 2018 at NED University involving invited stakeholders from the groups mentioned above. Further description of these activities can be found in section 8.3.7 as well as through documentation provided by the PMCCB Consultant.

614. Within the EPCM component of the PDA, stakeholder consultation outside of the EIA effort is carried out under the Resettlement Plan (RP) formulation and the Gender Action Plan (GAP). Brief descriptions of stakeholder consultations covering statistics, aims and objectives are included in later sections of this chapter.

615. Parallel aspects are ongoing and, while overlapping to some extent with 'public consultation' as envisaged under the EIA, both are complementary and overarch the other's scope in meaningful ways.

Sequential Activities under the EIA Scope

616. Since the project is well founded in prior planning, each element of which has its own basis in stakeholder involvement, there is a long history of public consultation related to the project. More specifically, public consultation was conducted as part of the PPTA in 2015-6 along various lines (resettlement, gender and EIA). Then up to the present under the EPCM Phase I work—the EIA is an evolving document which within any time frame incorporates what has gone before—broad-scope public consultation among institutional stakeholders has taken place. It is anticipated that once the EIA is accepted for review by Sindh EPA, there will be announcements in public media, and a public hearing will be conducted.

617. PMCCB Consultant conducted four days (3 hr evening sessions) from 22 – 28th Feb 2018 with representatives from Mosques, universities, schools and Residents Committees along the Red Line BRT corridor. The format of the meetings involved a short presentation to explain the project, and a series of structured questions put to participants to determine their views on different aspects of the system. Further description of these meetings as well as other aspects of the PMCCB outreach can be found in Sec 8.3.7.

618. Consultation and Focal Group Discussions were undertaken during the Process of preparing the Gender Action Plan. Gender issues in relation to transport; difficulties and risks women are exposed to in the use of public transport; the types of accommodation that women would like to see in a modern, well-designed mass transport system.

619. This overall schedule of public involvement constitutes the effort up until the start of construction. The following sections provide details on public involvement as described in this summary.

8.3 Process for Involvement of Public

8.3.1 Early Screening

620. The Project was screened beginning with its initial proposal under the JICA-funded KTIP in 2012. The Project has been part of the broad scope of transport improvement options under proposal by the Government of Sindh and has received early screening within the context of the overall

plan. Descriptions of public involvement are many in the KTIP documentation, including its Household Interview Survey (HIS) that involved the interviews of around 40,000 households in Karachi.

8.3.2 Public Consultation during the PPTA

621. Early consultation consisted of outreach conducted during the PPTA phase of the project, and then early in the detailed design period with an initial stakeholder meeting among institutional stakeholders.

622. During the PPTA phase, consultation meetings were undertaken with numerous government officials, some NGOs, and academic staff of universities. The stakeholders consulted represent a broad assortment of local administrators, transport professionals, associations, transport police, educational institutions, and research institutes, including the Pakistan Heritage Foundation, Sindh Heritage Committee and other groups with an interest in services on the Project corridor where the KBRT will be implemented. Government departments were also consulted. Consultations under the PPTA took place between January and August 2015.

623. Surveys were conducted in which several hundred Individuals representing all the districts along the alignment were informed about the Project. These stakeholders represented a broad cross section of informed opinion for the community living in the area, the road users, the business associated with the road and locally elected representatives. All persons consulted were in favor of the project. There was little that was likely to cause them or the public not to support the Project, but in general supported Rapid implementation as one means to reduce environmental impact. Some expressed concerns that alternative travel options should be considered in the construction phase. Some concerns were expressed about the sustainability of other bus and transport services after the KBRT is implemented.

8.3.3 First Stage of Consultation under the EPCM

624. A public meeting of invited institutional stakeholders was held at the Marriott Hotel in Karachi on 16 Feb 2018, and attended by some 56 persons representing a variety of institutional interests. There was active interest in environmental aspects of the project. A presentation was made that reviewed the project components, contents of the EIA, expected environmental impacts, and management plan and framework. The presentation was followed by comments by the attendees and responses by the PIU and EPCM team.

625. Attendance and record of comments are found in Appendix-L & Appendix-H respectively. Concerns voiced by the participants centered on practical aspects of implementation to assure environmental soundness within the community, including utility relocation in advance of construction, correct placement and development of depot sites, drainage during construction and operations, due consideration of the numerous educational and recreational facilities along the route, need for cumulative assessment, traffic considerations, need for coordination of work on utilities and road construction, role of SEPA in monitoring, replacement of vegetation and trees, need for good analysis of air quality and noise in the EIA, and a proposal for a permanent steering committee to oversee environmental aspects of project implementation. The EIA preparers have carefully reviewed the comments and taken them into account in the EIA.

8.3.4 Socioeconomic survey activity

626. Socioeconomic sample survey of affected households was conducted on April 11, 2018 and the affected business owners were interviewed through a formal survey tool (a detailed questionnaire). Most of the people had positive comments regarding KBRT red line project and the key comment recorded are as follows:

- Karachi BRT Red Line service will facilitate the middle class and lower middle class with cheap and safe transportation in Karachi.
- The time is valued which will be saved through Red Line bus travel for all the passengers.
- There is a hope to have a reliable livelihood source for the small vendors within the K- BRT setup.
- During construction the small vendors would have a challenging situation, but its in the betterment of all citizens of Karachi who cannot afford private taxis and other expensive transport alternatives exists in Karachi.
- People will prefer to travel in Red Line Bus instead of their own vehicles, caused to reduce heavy traffic on road, which will reduce air pollution and improve the quality of environment.
- Women would be safely travel from one place to another in the separate compartment and harassment issues will be reduced.
- School students would have less time taking, safe and a systematic transport facility to travel for their educational institutions as shown below

Figure 8-1: Project Affected Business Owner.

8.3.4.1 Focus Group Discussions & Consultation with Affected Stakeholders

627. Two Focus Group Discussions (FDGs) were carried out on March 09, 2018 with ambulant sellers located on the route of the Karachi BRT (KBRT) Red Line Project. Different locations along the route were selected to conduct FDGs to capture the wide variety of local vendors. Each FGD consisted of 20-25 ambulant sellers with only male attendants as there were no female sellers present in the area.

628. The concerns raised by sellers Figure 8-2and Figure 8-3 during the FGDs included:

- Issues faced with Karachi Metropolitan Corporation (KMC) due to their 'clean up of encroachment' campaigns
- The potential of providing alternative, permanent vending spaces for them
- Their need to escape from the continuous cycle of precariousness and poverty

Figure 8-2: Focus Group Discussion with Push Cart owners at Old Vegetable Market/ Askari Park.

Figure 8-3: Focus Group Discussion with Push Cart owners at the location of Mosmiyat.

8.3.4.2 Consultations with Non-for-Profit Organizations (NGOs) and local stakeholders

629. A consultation with the NGO of the National Forum for Environmental & Health Figure 8-4 Karachi was undertaken on March 7, 2018. The topics discussed were:

- Shop keepers, Car show rooms and hotels will directly be affected by the project's construction activities.
- Vendors must be provided alternative sources of livelihoods
- District Municipal Corporation (DMC) must make an inventory for the trees along the route so that a detailed plan for tree planation can be developed.
- The Anti-Encroachment Cell which comes under the authority of KMC deals with the encroachers along with the roads within Karachi.
- Construction projects are usually delayed by multiple years prolonging their impacts on the surrounding population.
- Dust and noise will negatively impact people who live and work around the project site. Standing water and other dumped material on the roads and sidewalks can cause additional disturbances for people trying to get to their offices, schools and homes. Even emergency vehicles are at times affected.
- The government does not manage the construction period and the divergence of traffic well.
- The ambulant sellers and local businesses unofficially pay a monthly fee / rent for their space on road or foot path.

Figure 8-4: Consultative meeting with National Forum for Environment & health under Karachi BRT Project.

8.3.4.3 Consultative meeting with Transport Experts

630. Consultations with local transport experts, who have worked on similar projects were held on March 08, 2018. The meeting was held in Hotel Marriott at Karachi.

631. The following information was discussed during the session:

- Karachi has no rapid bus transport system currently and the public is in need of one.
- The successful implementation of such a project would be much welcomed.
- One of the experts shared his experience of the Liyari Express project and its resettlement challenges and the ultimate delay in the project completion.
- Ambulant vendors and other small businesses along the route will certainly be negatively impacted by the construction of the BRT.
- Some vendors selling food might be able to continue vending at bus stops.
- One lesson learned from previous projects is that all relocated people tend to come back to their original location. If the government compensates them, they will take advantage and benefit from the system.

Figure 8-5: Project Consultative meeting with Transport Experts at Hotel Marriott, Karachi.

8.3.5 Socioeconomic consultation undertaken in December 2017 and February 2018

632. Figure 5-17 depicts some of the socioeconomic survey and data collection activities along the alignment

8.3.6 Consultation during preparation of the Gender Action Plan

633. A number of stakeholder consultations involving one-on-one and small group discussions took place during formulation of the Gender Action Plan, as listed in Table 8-1. Refer to other project documentation for details of discussions.

Table 8-1: KBRT Red Line consultation conducted by EPCM/ PIU/PMCCB

Sr No	Consultation conducted by	Consultation with	Location	Date and Time	Issues/Concerns
1	PMCCB	Students, mosque and community representatives, academics, planners	NED University	28 February 2018 6.00 – 9.00	• Issues with current transport situation eg congestion, pollution, lack of government policing of traffic laws • Concern about the removal of trees and the need to replace them • Concern from business

					people along the corridor about parking for their customers. Also for the shopping malls – concern about where people will park. Also concern expressed about parking on religious days • Concern about pollution • Information requested about when construction will commence and when operations are expected to start • Concern about ensuring maintenance of buses • Request for information in Urdu and Sindhi • Should have a rent-a-bike scheme on stations • There should be a PA on buses to make announcements such as next stop • Question about resettlement • Need for security guards, emergency call phones and drinking water on stations
2	PMCCB	Students, mosque and community representatives, academics, planners	NED University	27 February 2018 6.00 – 9.00	• Issues with current transport situation • Needs to be management during construction • We need to improve ourselves to use infrastructure first and then improve infrastructure • Buses should be local • Stations should be at walkable distances and buses should be regular and on schedule • Women and men should have separate sections in the

					buses • Buses should have light colours on them – not hot colours • There should be drinking water available on the stations • Buses should be non-smoking, have air conditioning and have announcements about the stops coming up • There should be advertisements allowed to get non fare revenue • Concern about accidents happening during construction • Concern about transparency with regard to jobs being offered
3	PMCCB	students, mosque and community representatives, academics, planners	NED University	26 February 2018 6.00 – 9.00	• Issues with current transport situation including role of bureaucracy, senior police and regulation of traffic, and people driving without current licences, condition of vehicles, use of CCTV • BRT should have security measures, should have monthly coupon ticket so don't have to go to get ticket each time, ladies, disabled and elderly given priority, complaints system, names of stations visible in buses, information in Urdu and Sindhi, discounted student fares, should be police stations along the BRT corridor, what is diversion plan for vehicles during construction? Drainage needs fixing. It is OK to employ women but they shouldn't do

					heavy work.
4	EPCM/PIU	NGO Sheri	Shehri office	26 February 2018 10.00 – 11.00	• Problems with current transport situation generally and especially for women • Features that would encourage use of the BRT by all potential users and message to users to respect the service and look after it • Concerns with trees being removed, space for private vehicles to use would be reduced and buses would increase pollution • Discussion about how to make a women only bus service successful and how to get women to be bus drivers • Discussion about the sensitivity of police when women report harassment and where women can report harassment
5	EPCM /PIU team	Additional Secretary WDDs	Women Development office	23 February 2018 2.30 – 3.30	• Patriarchal culture in Pakistan • Transport problems • Needs for BRT so that women will want to use it • Harassment law and its implementation • PPP agreements and the implications for the BRT contracts • Proportion of women working on the BRT should be increased to 20% • Discussion about how women could be trained as bus drivers • Discussion about gender equality in the public service
6	PMCCB	students, mosque and community representatives,	NED University	22 February 2018 6.00 –	• Issues with current transport situation • Recommendation that there

		academics, planners		9.00	should be 50% of seats kept for women • Recommendation that there is a movable partition between women and men in the bus or that there is a complete partition between the women and men's section • Concerns raised about heritage buildings and green space • Question about resettlement process • Question about parking
7	EPCM /PIU team	URC team	Urban resource Centre (URC office	21 February 2018 12.00 – 1.00	• Current transport situation including traffic accidents • Increased demand for safe transport by women who are working outside the home more in Karachi • Harassment • Issues for transgender • Abuse of children and child protection • Mobility for people with disability • Need for a women only bus and how it could be successful • How to get women to be bus drivers • Need for proper training and drug testing of drivers • How to ensure women hear about employment opportunities • Sensitivity of police to deal with women's harassment complaints • How to get low income people to use the service: (i) subsidised fares (ii) easy access to transport (iii) no

					technological barriers for people with low education levels eg use of ticket machines - should have someone there to help
8	EPCM/PIU team	PMCCB ,NesPAK representative & women users of public transport.	Foresight House PECHS	20 February 2018 2.00 – 3.00	• Issues women face in using public transport • What would make women want to use public transport: bus configuration, ease of getting on and off the bus, fares, reduced travel and waiting times, measures to reduce harassment, protection on stations, route to be extended to the Towers, schedules which are adhered to, sufficient stopping time for women to get off the bus. • Women expressed interest in work on the BRT • Concerns about maintenance of the service raised
9	EPCM team	Aurat Foundation	Aurat Foundation Office	15 February 2018 10.30 – 12.00	• Problems with public transport for citizens generally and specifically for women, people with disability • Discussion about sexual harassment • Emergency helplines • What would be necessary for a successful women only bus service • Fares and subsidies • Women's employment (quota) on BRT and representation on Boards of Directors • Harassment problems for women • Women-only buses • Roadwork's improvement • Transgender issues

					• Increasing government concern with transgender community
10	EPCM/ PIU	Faculty and students	University of Karachi Sociology Department	8 December 2017 9.00	• Discussion experiences of women students on public and private transport and reluctance to use public transport • Harassment issues of women using public transport • Bus features that may encourage women students to use BRT
11	EPCM/ PIU	TL ODBM, female engineers	ODBM office	5/12/2017	• Design of facility operations
12	EPCM/ PIU	PDD Gender and directorate staff	Planning and Development Dept	8/12/2017	• Transport problems, Movable partition in bus, Women only bus, Workshopping the GAP, Committee to monitor GAP implementation

8.3.7 PMCCB outreach

634. The Project Management Coordination and Capacity Building (PMCCB) component of the PDA provided a comprehensive approach to consult with members of the public and community stakeholders about the project, in order to collect their views and opinions on the proposed design and operation of the Red Line BRT system via the Community Awareness and Participation Programme (CAPP) , as well as with vulnerable groups identified in association with the project inclusive of disabled public transport users, female public transport users and low income groups using public transport.

Community Awareness and Participation Programme.

635. The CAPP was conducted using a two-phased approach involving face to face meetings with key stakeholders followed by a series of structured public stakeholder consultations. Face to face meetings were conducted using topic guides designed to facilitate a discussion of around 20 to 30 minutes with each stakeholder representative. Interviews were conducted in Urdu to ensure that interviewees could understand the project and were able to contribute to the subsequent discussion. Stakeholders thus consulted consist of groups listed in Table 8-2.

Table 8-2: Stakeholder Groups Consulted using 1-2-1 Interviews under CAPP

Stakeholder type	Name of organization	Interview Date
Mosque	Masjid O Imam Bargah Madina-tul-Ilm	15/07/2017
	Motomar Alam al Islami	10/08/2017

	Masjid Imam Ibn-e-Tamiya	16/07/2017
	Jamia Masjid Bait-ul-Mukaram	15/07/2017
	Jamia Masjid Faizan e Madina	14/07/2017
	Jamia Masjid Tayyab	14/07/2017
	Imambargah Mahfil Abu Fazal Abbas Alamdar	16/07/2017
School	The Educators	02/08/2017
	White House Grammar School	02/08/2017
	Smart School	02/08/2017
	Chiniot Islamia Public School	02/08/2017
	Kings School	02/08/2017
University	Karachi University	01/08/2017
	NED University of Engineering & Technology	19/07/2017
	Federal Urdu University	19/07/2017
Trade association	Karachi Chamber of Commerce and Industry	21/08/2017
	Karachi Tajir Ittehad	18/08/2017
National Government	National Highway Authority	21/07/2017
	Pakistan Civil Aviation Authority	24/01/2018
	Planning Commission of Pakistan	21/07/2017
Local Government	Transport and Mass Transit Department, Government of Sindh	19/06/2017
	Works and Services Department, Government of Sindh	29/06/2017
	Regional Transport Authority, Government of Sindh	19/06/2017
	Environment & Alternative Energy Department, Government of Sindh	23/06/2017
	Planning and Development Department, Government of Sindh	19/06/2017
	Sindh Building Control Authority	22/06/2017
	Karachi Transport & Communication Department	19/06/2017
	Karachi Mass Transit Cell	19/06/2017
	Karachi Public Transport Society	17/06/2017
	Karachi Metropolitan Corporation	23-06-2017
	Provincial Transport Authority	21/06/2017
	Malir Cantonment Board	10/07/2017
	Karachi Traffic Police Department	29/06/2017
	Traffic Police Malir	06/07/2017

636. Four advocacy organizations also were interviewed as part of Customer Awareness and Outreach in order to address the needs of the groups they represent, as set out in Table 8-3.

Table 8-3: Customer Awareness and Outreach: Vulnerable Groups, Public Engagement

Vulnerable Group	Advocacy group engaged	Interview Date
Disabled people	Pakistan Disabled Foundation	19/07/2017
Urban poor	Urban Resource Centre	07/08/2017
Women	Aurat Foundation	18/08/2017
Public transport users	Shehri - Citizens for a Better Environment	17/07/2017

637. The views, opinions and concerns raised during interviews with representatives of each advocacy group are outlined in the respective reports of the PMCCB, ITP 2018 and 2018a. These reports became available late in the process of project preparation; the results of the stakeholder discussions can be used to inform aspects of the EIA with comments such as:

- It is important to develop an integrated BRT network rather than a single, standalone BRT line, however currently integration of the BRT lines does not appear to have been thought through (Urban Resource Centre)
- The use of footbridges to enable pedestrians to cross the BRT can be problematic as the number of steps can make them difficult for elderly and disabled people to use. Providing underpasses instead of footbridges would be preferable as they have fewer steps. (Urban Resource Centre)
- Various comments in relation to accommodating to the needs of women in developing the Red Line BRT system, which are generally reflected in the Project's Gender Action Plan (Aurat Foundation)
- Construction of the Green Line BRT has resulted in construction materials and debris spread over the nearby roads which has caused dust pollution as well as creating difficulties for traffic flow, which could also occur during the construction of the Red Line BRT system (Shehri)
- Unauthorized construction and poor planning of the storm water drainage system has led to serious problems for the public and traffic during periods of heavy rain (Shehri)
- Approximately 12,000 members travel to/from Faizan-e-Madina Centre each day. Currently there are approximately 4,000 motorbikes parked on main road outside the mosque. Visitors to the Faizan-e-Madina will provide a high number of passengers for the BRT system and it is hoped that current users of motorbikes and other vehicles may prefer to use BRT instead. (Jamia Masjid Faizan e Madina)
- The religious event of Dawat-e-Islami is held regularly on Thursdays and Saturdays. During these events two lanes of the road are used and it will be necessary to consider this during the planning stage of the scheme. It was also suggested that the location of the bus stop be finalized in consultation with the Faizan-d-Madina coordination committee. (Jamia Masjid Faizan e Madina)

8.3.8 Second Stage of Public Consultation

638. The Sindh EP Regulations (2014) require conduct of a public hearing within the overall context of review and approval for the EIA. This public hearing will constitute the second phase of public consultation prior to commencement of construction. This approach is performed within a framework for EIA process and government/public review, including preparation, payment of fees, filing with accompanying documents, preliminary scrutiny not to exceed 15 days, and disclosure via announcement in national and local newspapers. A four-month period follows providing time for agency review and public comment, and review before a Committee of Experts, as part of the public review process.

8.4 Further Milestones in Public Involvement

639. The formal public hearing for the EIA provides the next forum for Public Consultation on the project. Following that, informal and frequent opportunities for public involvement during the course of construction are expected. For instance, the Contractor should inform the nearby public of planned activities, post signs, and engage the local community in issues that affect the public welfare.

8.5 Grievance Redress Mechanism

640. A project grievance redress mechanism (GRM) was proposed during the PPTA stage that has been adopted provisionally for the project. By the time of contract award, the GRM established for the RP and land acquisition plan (if any) will need to be reconciled with the current proposal, and the two made compatible, so that it works most efficiently for both resettlement and environmentally related grievances. The resolution of both provisional GRM proposals can best be accomplished by the Phase II EPCM consultant prior to start of construction, or by the Phase I consultant once approval of the EIA is complete.

641. The purpose of the GRM is to receive, evaluate and facilitate the resolution of affected person's concerns, complaints and grievances about the social and environmental performance of the Project during its construction. The GRM will provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

642. The TMTD PIU will make the public aware of the GRM through public awareness campaigns. The contact phone number of the PIU and the SMTA will serve as a hotline for complaints and will be publicized through the media and placed on notice boards outside their offices and at construction sites. The project information brochure will include information on the GRM and will be widely disseminated throughout the corridor by the safeguards officers in the SMTA and PIU. Grievances can be filed in writing or by phone with any member of the TMTD and PIU.

643. **First tier of GRM.** The PIU is the first tier of GRM which offers the fastest and most accessible mechanism for resolution of grievances. The PIU staff for environment and social safeguards will be designated as the key officers for grievance redress. Resolution of complaints will be completed within seven (7) working days. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, traffic police, etc.). Grievances will be documented and personal details (name, address, date of complaint, etc.) will be included unless anonymity is requested. A tracking number will be assigned for each grievance, including the following elements:

- Initial grievance sheet (including the description of the grievance), with an acknowledgement of receipt handed back to the complainant when the complaint is registered;
- Grievance monitoring sheet, mentioning actions taken (investigation, corrective measures);
- Closure sheet, one copy of which will be handed to the complainant after he/she has agreed to the resolution and signed-off.

644. The updated register of grievances and complaints will be available to the public at the PIU office, construction sites and other key public offices along the project corridor (offices of the districts). Should the grievance remain unresolved it will be escalated to the second tier.

645. **Second Tier of GRM**. The PIU will activate the second tier of GRM by referring the unresolved issue (with written documentation) to the SMTA who will pass unresolved complaints upward to the Grievance Redress Committee (GRC). The GRC will be established by SMTA before start of site works. The GRC will consist of the following persons: (i) Project Director; (ii) representative District; (iii) representative of the affected person(s); (iv) representative of the local Deputy Commissioners office (land); and (v) representative of the SEPA (for environmental-related grievances). A hearing will be called with the GRC, if necessary, where the affected person can present his/her concerns/issues. The process will facilitate resolution through mediation. The local GRC will meet as necessary when there are grievances to be addressed. The local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within fifteen (15) working days. The contractor will have observer status on the committee. If unsatisfied with the decision, the existence of the GRC will not impede the complainant's access to the Government's judicial or administrative remedies.

646. The functions of the local GRC are as follows: (i) resolve problems and provide support to affected persons arising from various environmental issues and including dust, noise, utilities, power and water supply, waste disposal, traffic interference and public safety as well as social issues and land acquisition (temporary or permanent); asset acquisition; and eligibility for entitlements, compensation and assistance; (ii) reconfirm grievances of displaced persons, categorize and prioritize them and aim to provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

647. The SMTA officers will be responsible for processing and placing all papers before the GRC, maintaining a database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out.

648. **Third tier of GRM**. In the event that a grievance cannot be resolved directly by the PIUs (first tier) or GRC (second tier), the affected person can seek alternative redress through the district or sub-district committees as appropriate. The PIUs or GRC will be kept informed by the district, municipal or national authority. The grievance redress mechanism and procedure are depicted in Figure 8-6 below. The monitoring reports of the EMP and RP implementation will include the following aspects pertaining to progress on grievances: (i) Number of cases registered with the GRC, level of jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as Name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e., open, closed, pending).

8.6 Summary of Information Disclosed

649. ADB SPS (2009) states: "Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders."

650. SEPA rules state: "the Agency will simultaneously with issue of confirmation of completeness . . ., cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of

project, its exact location, the name and address of the proponent and the places at which the EIA of the project can . . . be accessed."

651. As of this early draft of the EIA, no disclosure has taken place other than its presentation in public fora as described in earlier sections. Cognizant of the time frame for project implementation, including presentation before the Board of the ADB, the EIA is on track for review and consideration, as well as posting on ADB and SMTA websites and available hard copies, in compliance with requirements described above.

8.7 Summary of Public Acceptance and Opinion

652. There has been broad dissemination of particulars related to the Project, over time and in numerous venues; there is wide acceptance of the project among stakeholders. Both institutional stakeholders and members of the general public who are present at meetings and in one-on-one settings do not raise objection to going ahead with the Project. It is readily acknowledged that there is a clear need for significant and transformative change in the approach for public transport efficiency in Karachi. It has been a long and deliberative process to arrive at the most appropriate approach for delivery of this essential public service. The Red Line is a key element in that approach.

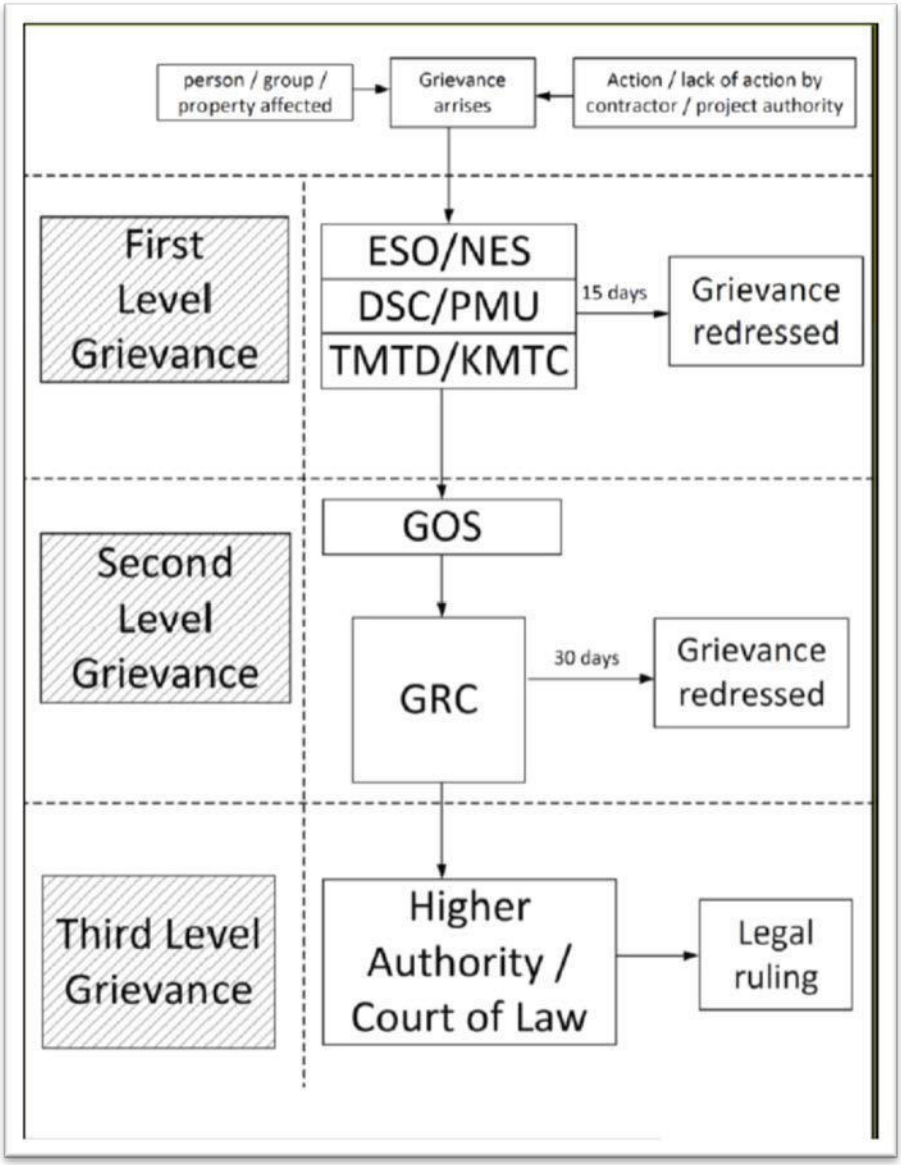

Figure 8-6: Flowchart for Grievance Redress Mechanism

9. Conclusions and Recommendations

9.1 Compliance with ADB and Sindh Government Policies

653. The Karachi BRT Red Line Project is compliant with GOS and ADB policies and regulations concerning environment, social impact, resettlement and compensation, and local administration. Sector guidelines related to the environment, public transit design and construction, systems and traffic safety, and public health are complied with through completion of project preparatory and detailed studies. ADB's policies in regard to screening and categorization have been met through preparation of a Rapid Environmental Assessment (REA) checklist. The EIA Report and EMP provide a means for environmental management through the implementation phase.

9.2 Gains That Justify Project Implementation

654. The Karachi BRT Red Line Project provides one of several means being used in tandem for alleviating Karachi's transport problems. A clear right of way in the public domain allows the project to be built without any land acquisition. The project provides improved access between residential and business areas. In conjunction with other transport systems, the alignment serves the core of the City, and provides direct access to the CBD. The selection of the Red Line alignment for early development of the Karachi BRT was conditioned by the need for transport improvements in core areas, with the current alignment for the Red Line as the logical choice for early development.

655. Greenhouse Gas (GHG) emissions will likely be reduced by removing vehicles from the roadway, assuming a passenger equivalence between BRT use and vehicle numbers without the project. A preliminary estimate shows the potential for removal of 47 – 94 tons of CO2 per day, based on capture of 20% to 40% of daily passenger trips along the route by the BRT.

9.3 Adverse Effects

656. Karachi BRT Red Line Project has no long term adverse environmental impact; once constructed and in operation the BRT will enhance its local environment and improve mobility for local communities. The low visual profile of BRT bus stations will merge with the environment's structural and biophysical aspects (buildings and trees with similar height dimensions); the face of the typical station is undemanding to the eye and over time merges with the background visual environment. The SMTA and PIU are committed to the use of landscaping to enhance and beautify areas within the project boundary. Other aspects of the Facility once in operation do not pose environmental impact if correctly operated and maintained.

657. The project design incorporates measures for reducing the impact or footprint of the Project. Modern equipment and facilities are designed into the system. An extensive ITS and other interlinked systems assure enhanced bus movement and passenger safety. Environmental work was interfaced with project design to assure incorporation of needed features, such as ease of access to stations and NMT facilities.

658. Social impacts on local transport providers due to the competitive nature of the BRT is discounted: a) the BRT once operational becomes a member of the set of transport alternatives

for Karachi that is always functioning at capacity; and b) employees and entrepreneurs are people that adjust to changing times, and just as the BRT may temporarily disadvantage some, to others it offers both jobs and new transport opportunities.

9.3.1 Adverse Effects Minimized

659. The mitigation measures proposed for application to individual construction and supply contracts minimize adverse effects that occur during construction. Air, noise and water pollution levels will be monitored periodically. Requirements for maintaining clean work space; pedestrian and vehicle access around and through work areas; enclosed or piped drainage from work sites; roadways used for haul roads and lanes adjacent to work spaces free of dust and in good repair; visible signage and traffic directional controls; worker visibility and mandatory use of traffic vests and PPE equipment; maintenance of drainage, provision of temporary lighting, and dust control at temporary yards and construction sites; and other features included in the EMP serve to minimize impacts and increase its acceptability to the local community. Specific planning protocols to be developed and implemented by the contractor for traffic, health and safety, HIV prevention and emergency response further mitigate impacts during construction.

660. Even given the highest degree of performance of mitigation measures, construction of the KBRT will alter local environmental conditions in negative ways over the duration, through increased levels of ambient dust and noise, congestion from reconstruction of the center portion of the roadway and the continuous movement of trucks removing spoil and placing road bed materials.

661. Adverse effects will be minimized during operations by incorporating environmental requirements into tender documents for recruitment of bus service and ITS/facility operations contracts.

662. Social impacts are minimized by relocating street-side vendors so their occupations can be continued. The Project seeks to exert minimum impact on permanent storefronts along the alignment and to minimize the effect on access and pedestrian movement, since most activity takes place in the roadway.

9.3.2 Adverse Effects Offset

663. Trees will be removed from the roadway in preparation for developing the carriageway and stations. Trees will be replanted at specified locations within and outside the project boundaries to offset those removed, according to the ratio set by the Government and procedure of the Directorate of Parks and Horticulture, Karachi Metropolitan Corporation.

9.3.3 Adverse Effects Compensated

664. Some compensation may be paid in specific instances related to disturbance that affects livelihood, or temporary relocation out of the line of work. Any such instances will be identified in the RP and adjudicated in keeping with its guidelines. No compensation has been identified strictly related to environmental impacts of construction. Minor amounts of land are acquired for the depots under voluntary acquisition from the Ranger Corp. Any other land parcels required for the project are listed in the RP, and the means of acquisition described.

9.3.4 Irreplaceable Resources

665. There is no use of irreplaceable resources in relation to the Karachi BRT Red Line Project.

9.4 Pollution Prevention, Clean Production and Energy Efficiency

666. Opportunities for reduced energy consumption and clean use, if not production, of energy abound under the KBRT Red Line framework. The change from individual private vehicle, and from dirtier and less fuel-efficient buses, to cleaner and more fuel-efficient buses, is a clear benefit of the project. Also, good practice engenders replication and good practice elsewhere. The KBRT system, once successfully implemented, will inspire Karachi to follow with other BRT lines.

9.5 Worker and Community Health and Safety

667. Emphasis has been placed on community and occupational health and safety in development of environmental safeguards for the KBRT. Implementation of safeguard measures during construction will reduce and, in some cases, eliminate impacts on the community, and reduce accident risk while preserving the health of workers. Risk and emergency response for users of the system, and operations contractor's employee health and safety programs, are being addressed by the ODBM consultant.

9.6 Preservation of Cultural Resources

668. The Karachi BRT Red Line Project does not cause any deterioration or loss of physical cultural resources, with the exception of the People's Secretariat Chowrangi, a park area which will be irrevocably altered.

9.7 Provisions for Follow-Up Surveillance and Monitoring

669. A systematic approach for surveillance and monitoring is provided by means of a management framework, and inspection/monitoring and reporting protocol. Follow-up public consultation is intended to provide future input to the identification of environmental impact during the construction phase. A grievance redress mechanism (GRM) will be put into effect for project affected persons. The resettlement component of the project has identified the numbers of affected persons, households and businesses; confirmed that there are no locations requiring involuntary (either total or partial) land acquisition; and set out a schedule for provision of compensation for situations where livelihoods are temporarily interrupted. The EMP will be incorporated into individual contract bidding documents along with an Environmental Construction Specification (ECS), which together form the basis for legally guaranteeing environmental performance of the contractor. Periodic monitoring will be undertaken by TMTD PIU supported by the CSC, and quarterly reports provided to the financing agency (ADB) and state agencies as required.

Appendices