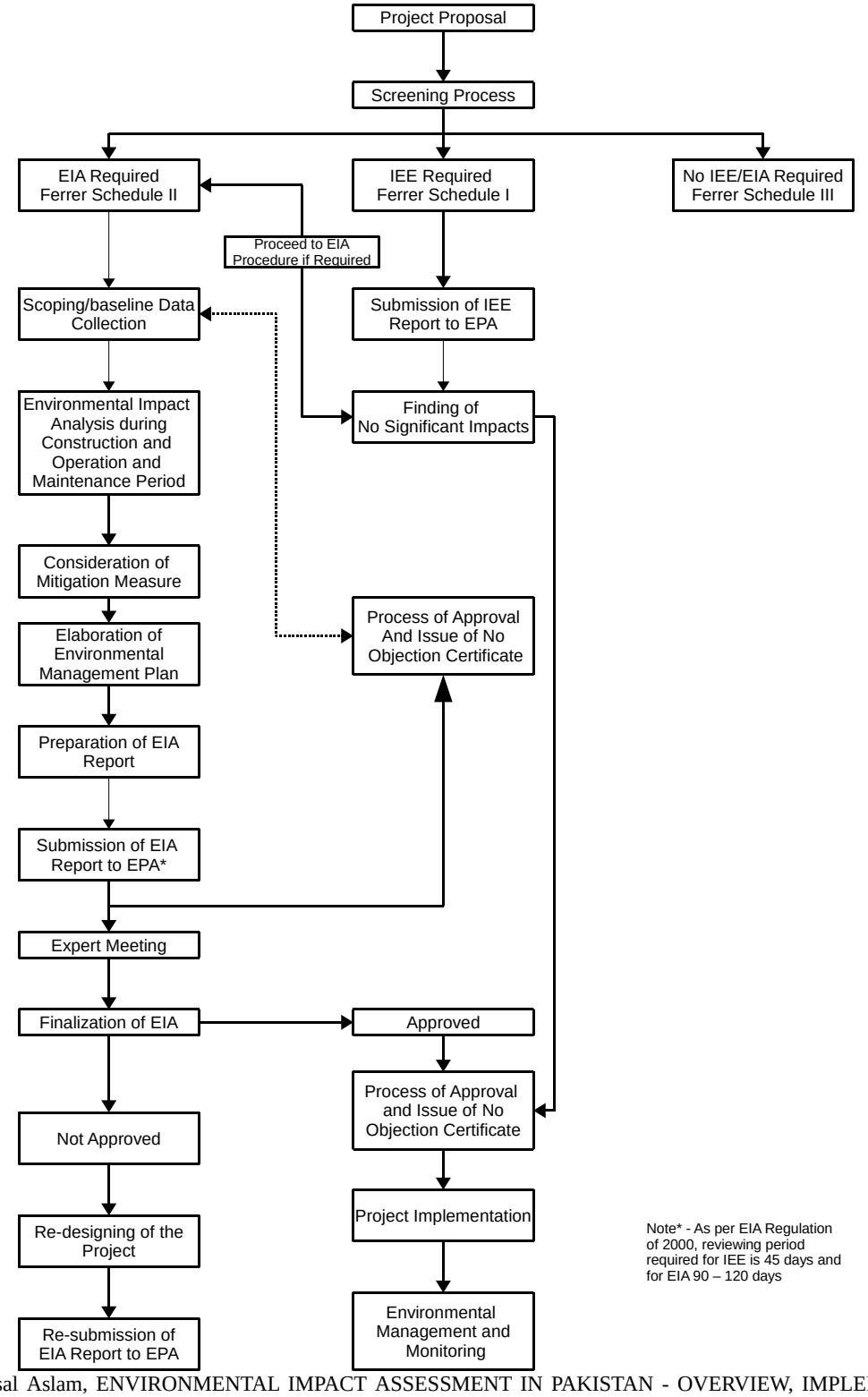
APPENDIX-5 CURRENT ENVIRONMENTAL CONDITIONS, SCOPING AND THE METHOD OF ENVIRONMENTAL EXAMINATION

1. EIA Procedure in Pakistan



Source: Faisal Aslam, ENVIRONMENTAL IMPACT ASSESSMENT IN PAKISTAN - OVERVIEW, IMPLEMENTATION AND EFFECTIVENESS, June 20056

Figure A5-1-1 Procedure of EIA in Pakistan

2. NEQS for Motor Vehicles Exhaust and Noise

NEQS promulgated under PEPA 1997 and revised in 2000 was amended in 2009. Under the Section 6 of PEPA 1997 provides for the emission standards for motor vehicles, both diesel and petrol of different categories.

During construction and post development phase of a project, the NEQS for Motor Vehicles Standard and Noise will apply to all vehicles involved in the project activities including construction machinery.

Table A5-2-1 Proposed National Environmental Quality Standard for Noise

S. No.	Category of Area / Zone	Effective from 1st January, 2009		Effective from 1st January, 2010	
		Limit it in dB(A) Leq*			
		Day Time	Night Time	Day Time	Night Time
1	Residential area (A)	65	50	55	45
2	Commercial area (B)	70	60	65	55
3	Industrial area (C)	80	75	75	65
4	Silence Zone (D)	55	45	50	45

Note: 1 Day time hours: 6.00 a. m to 10.00 p. m
2 Night time hours: 10.00 p. m to 6.00p. m
3 Silence zone; Zone which are declared as such by competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.
4 Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.
*dB(A) Leq Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

Source: Advertisement regarding public opinion/comments on national standards for noise (Pak-EPA)

Table A5-2-2 National Environmental Quality Standard for Ambient Air

Pollutant	Time-weighted average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st January 2009	Effective from 1st January 2012	
Sulfur Dioxide (SO_2)	Annual Average*	80µg/m^3	80µgm^3	Ultraviolet Fluorescence Method
	24 hours**	120µg/m^3	120µgm^3	
Oxides of Nitrogen as (NO)	Annual Average*	40µg/m^3	40µgm^3	Gas Phase Chemiluminescence
	24 hours**	40µgm^3	40µgm^3	
Oxides of Nitrogen as (NO_2)	Annual Average*	40µgm^3	40µgm^3	Gas Phase Chemiluminescence
	24 hours**	80µ gm^3	80µgm^3	
O_3	1 hour	180µgm^3	130µgm^3	Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400µgm^3	360µgm^3	High volume Sampling, (Average flow rate not less than 1.1m^3/minite)
	24 hours**	550µgm^3	500µgm^3	
Respirable Particulate Matter (PM10)	Annual Average*	200µgm^3	120µgm^3	B Ray absorption method
	24 hours**	250µgm^3	150µgm^3	
Resipirable Particulate Matter (PM2.5)	Annual Average*	25µgm^3	15µgm^3	B Ray absorption method
	24 hours**	40µgm^3	35µgm^3	
	1 hour	25µgm^3	15µgm^3	
Lead (Pb)	Annual Average*	1.5µgm^3	1µgm^3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2µgm^3	1.5µgm^3	
Carbon Monoxide (CO)	8hours**	5mg/m^3	5mg/m^3	Non Dispersive Infra Red (NDIR) method
	1hours	10mg/m^3	10mg/m^3	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

**24 hourly / 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.

Source: Advertisement regarding public opinion/comments on national standards for ambient air (Pak-EPA)

PEPA 1997 specifies the imposition of a pollution charge in case of non-compliance with the NEQS. However the standards for disposal of solid waster have not been promulgates to date.

Table A5-2-3 NEQS for Municipal and Industrial Effluents

S. No.	Parameter	Into Inland Waters	Into Sewage Treatment	Into Sea	Units
1	Temperature or Temp. increase	<3	<3	<3	^oC
2	pH value (H^+)	6-9	6-9	6-9	
3	Biological Oxygen Demand $(BOD)_5$ at 20 ^oC	80	250	80	mg/l
4	Chemical Oxygen Demand $(COD)_{Cr}$	150	400	400	mg/l
5	Total Suspended Solids (TSS)	200	400	200	mg/l
6	Total Dissolved Solids (TDS)	3500	3500	3500	mg/l
7	Oil and Grease	10	10	10	mg/l
8	Phenolic Compounds (as Phenol)	0.1	0.3	0.3	mg/l
9	Chloride (as Cl^-)	1000	1000	SC	mg/l
10	Fluoride (as F^-)	10	10	10	mg/l
11	Cyanide (as CN^-)total	1.0	1.0	1.0	mg/l
12	An-ionic detergents (as MBAS)	20	20	20	mg/l
13	Sulphate(SO_4^{2-})	600	1000	SC	mg/l
14	Sulphide(S^{2-})	1.0	1.0	1.0	mg/l
15	Ammonia (NH_3)	40	40	40	mg/l
16	Pesticides	0.15	0.15	0.15	mg/l
17	Cadmium	0.1	0.1	0.1	mg/l
18	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	mg/l
19	Copper	1.0	1.0	1.0	mg/l
20	Lead	0.5	0.5	0.5	mg/l
21	Mercury	0.01	0.01	0.01	mg/l
22	Selenium	0.5	0.5	0.5	mg/l
23	Nickel	1.0	1.0	1.0	mg/l
24	Silver	1.0	1.0	1.0	mg/l
25	Total toxic metals	2.0	2.0	2.0	mg/l
26	Zinc	5.0	5.0	5.0	mg/l
27	Arsenic	1.0	1.0	1.0	mg/l
28	Barium	1.5	1.5	1.5	mg/l
29	Iron	8.0	8.0	8.0	mg/l
30	Manganese	1.5	1.5	1.5	mg/l
31	Boron	6.0	6.0	6.0	mg/l
32	Chlorine	1.0	1.0	1.0	mg/l

Source: Statutory Notification, SRO-549(1)/2000, dated August 10, 2000, Ministry of Environment, Local Government and Rural Development, Government of Pakistan.

Table A5-2-4 NEQS for Motor Vehicles Exhaust and Noise

Parameter	Standards (maximum permissible limit)	Measuring method
Noise	85dB(A)	Sound-meter at 7.5meter from the source
Smoke	40 % or 2 on the Ringlemann Scale during engine acceleration mode	To be compared with Ringlemann chart at a distance of 6 m or more
Carbon Monoxide	6 %	Under idling condition: Non-dispersive infrared detection through gas analyzer

Source: Statutory Notification, SRO-72(KE)/2009, dated May 16, 2009, Ministry of Environment, Government of Pakistan.

3. Result of Scoping

3.1 Introduction

There are 6 LRT corridors and 4 BRT corridors, which are proposed as master Plan for JICA study. These proposed corridors are connecting the center of the city, industrial areas, residential areas and commercial areas of Karachi city.

For scoping on the potential environmental impacts of each corridor, 31 environmental parameters have been selected for assessment. Each environmental parameter is ranked from A to D (both positive/negative) depending on their environmental and social significance. These rating are generally based on the information of the site survey and aerial photographs where corridors are identified. Rating Criteria are shown as follows:

- A+/-: Significant positive/negative impact is expected.
- B+/-: Relatively positive/negative impact is expected.
- C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact or change could be clarified as the study progresses.)
- D: No or Negligible impact is expected.

3.2 Scoping of the Environmental Impacts

3.2.1 Environmental Scoping

Using the environmental scoping list initially identifies potential impacts on the environment during the pre-construction, construction and operation stages of the Project and matrixes as are shown in Table A5-3-1a - Table A5-3-6a.

Each LRT crridor generally follows the existing road aligment. There is a possibility of underground section constructed in the congested area while most of LRT's section will be the elevated structure.

3.2.2 Natural Environment

(1) No project

Potential impacts on the environment in the case of No-project (Zero-option case) are initially examined by using the environmental scoping list and matrixes as shown in Table A5-3-1a to A5-3-6a and Table A5-3-1b to A5-3-6b. The Zero-option examination was made on the conditions that i) the maintenance of the existing roads is the same as it is, and ii) no new investments are provided to improve the existing road networks or transportation system.

In general the lack of adequate public transport services and the recent enormous increase in private vehicle ownerships will worsen traffic jams, make road users relatively uncomfortable and inconvenient. Therefore, the Zero-option case will cause serious environmental impacts such as deterioration of air quality, especially emanation of the dust and nitrogen oxide, increased noise level, and risk increment of traffic accidents. Increment of greenhouse gas (GHG) will also be increased due to the increase of traffic volume and congestion, which increases idling time of each vehicle on the road. These factors would contribute to global warming issues in general.

Table A5-3-1a Draft Scoping on the Environmental and Social Considerations – Zero Option–

Item	Project Stage	Evaluation	Description
Social Environment			
Involuntary Resettlement	P,C,O	D	There is no significant impacts of the resettlement
Disruption or Improvement of Livelihood	P	D	No significant impact is expected.
	C	D	No significant impact is expected.
	O	B-	Worsening of the present traffic congestions would hamper further the livelihood of the citizens in Karachi.
Changes in the Employment and Local Economic Conditions	P	D	No significant impact is expected.
	C	D	No significant impact is expected.
	O	B-	Worsening of the present traffic congestions would hamper further the economic activities in Karachi.
Changes on the Land Use Patterns	P,C,O	D	No significant impact is expected.
Physical Division of the Local Communities	P,C,O	D	No significant impact is expected.
Existing Social Infrastructure and Services	P,C,O	D	No significant impact is expected.
Indigenous and Ethnic Minorities	P,C,O	D	No significant impact is expected.
Distribution of Benefits	P,C	D	No significant impact is expected.
	O	C-	Inequality among the stakeholders might be expected, since wealthy car owners would increase in the future and traffic congestions to the "Traffic Minorities" i.e. non-car-owners would further suffer.
Local Conflict on the Interests of the Project	P,C,O	D	No significant impact is expected.
Disruption of Water Right	P,C,O	D	No significant impact is expected.
Public Sanitation	P,C,O	D	No significant impact is expected.
Risks on the Hazardous and Infectious Diseases	P,C,O	D	No significant impact is expected.
Traffic Accidents	P,C	D	No significant impact is expected.
	O	B-	Increment of risks of accidents is expected due to the increase of vehicles.
Natural Environment and Pollution			
Geographical and geological conditions	P,C,O	D	No significant impact is expected.
Soil erosion	P,C,O	D	No significant impact is expected.
Ground Water	P,C,O	D	No significant impact is expected.
Surface Water	P,C,O	D	No significant impact is expected.
Coastal zone	P,C,O	D	No significant impact is expected.
Oceanographic changes	P,C,O	D	No significant impact is expected.
Flora and Fauna	P,C,O	D	No significant impact is expected.
Natural/Ecological reserves and sanctuary	P,C,O	D	No significant impact is expected.
Meteorology	P,C,O	D	No significant impact is expected.
Global warming	P,C	D	No significant impact is expected.
	O	C-	The possibility of increased of Greenhouse Gas (GHG) emission is expected due to the increment of car number as well as traffic congestions.
Air pollution	P,C	D	No significant impact is expected.
	O	C-	The possibility of deterioration of air quality, especially dust and nitrogen oxide, is expected due to the increment of car number as well as traffic congestions.

Item	Project Stage	Evaluation	Description
Water pollution	P,C,O	D	No significant impact is expected.
Soil contamination	P,C,O	D	No significant impact is expected.
Waste	P,C,O	D	No significant impact is expected.
Noise and vibration	P,C	D	No significant impact is expected.
	O	C-	The possibility of increment of noise and vibration is expected due to the increment of car number as well as traffic congestions.
Ground subsidence	P,C,O	D	No significant impact is expected.
Emanating odor	P,C,O	D	No significant impact is expected.
Bottom sediment	P,C,O	D	No significant impact is expected.

Legend of Project Stage
P: Pre-construction stage; C: Construction stage; O: Operation stage
Legend of Evaluation
A+/-: Significant positive/negative impact is expected.
B+/-: Relatively positive/negative impact is expected.
C+/-: Extent of positive/negative impact is unknown.
(A further examination is needed, and the impact or change could be clarified as the study progresses.)
D : No or Negligible impact is expected.

Source: JICA Study Team

Table A5-3-1b Draft Scoping Matrix on the Environmental and Social Considerations – Zero Option–

	No.	Items of the Environment Subject to Negative/Positive Changes / Project Activities	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage									Operation Stage					
				Survey/Study on the Project	Information on the Project	Participation to the SH Meeting	Land Acquisition and Resettlement	Clearing Vegetation/Top Soil for Preparation of the Construction Works	Earth Moving: Cutting and Filling of the Construction Works	Preparation of the Construction Areas, Work Camp and Mobilization of Construction Plants and Materials	Diversion of the Existing Road	Construction Works for Stations and Entrances on the Sidewalks/Privately Owned Land	Emanation of Dust, Noise and Vibration	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works	Improvement of Traffic Congestions	Improvement of Railway/Bus Stations and Other Facilities	Improvement of Road/Railway Safety	Improvement of Employment Opportunities	Improvement of Passenger-oriented Business	Improvement of Freight-oriented Business
Social Environment	1	Effects on the Livelihood of the Local Communities																			
		a. General	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
		b. Socially and Physically Disadvantaged	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
		c. Women and Children	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
		d. Ethnic Minority	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	2	Social Cohesion and Physical Continuity of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	3	Local Road Transportation System	C-	D	D	D	D	D	D	D	D	D	D	D	D	C-	D	D	D	D	D
	4	Distribution of the Benefit of the Project	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	5	Effect on the Social and Cultural Events and Tradition	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	6	Effect on the Local Economic Activities																			
		a. Industrial Areas	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
		b. Commercial and Busines Areas	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	7	Effect on the Water Rights/Commons for Grazing etc.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	8	Public Hygiene and Health Care of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	9	Vulnerability/Resilience of the Society to Natural Disaster	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	10	Traffic Safety	B-	D	D	D	D	D	D	D	D	D	D	D	D	B-	D	D	D	D	D
	11	Changes on the Land Use and the Landscape	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Natural Environment	12	Geographical Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	13	Geological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	14	Soil Erosion	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	15	Faunal Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	16	Flora Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	17	Effects on the Ground Water	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	18	Effect on the Surface Water Body (River, Lakes, etc)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	19	Effect on the Coastal Environment	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	20	Oceanographic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	21	Effect on the Natural/Ecological Reserves and Sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	22	Localised Climatic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	23	Effect on the Global Warming Issues	C-	D	D	D	D	D	D	D	D	D	D	D	D	C-	D	D	D	D	D
Pollution	24	Air Pollution	C-	D	D	D	D	D	D	D	D	D	D	D	D	C-	D	D	D	D	D
	25	Water Pollution	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	26	Soil Pollution	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	27	Solid Waste and/or Industrial Discharge Management	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	28	Noise and Vibration	C-	D	D	D	D	D	D	D	D	D	D	D	D	C-	D	D	D	D	D
	29	Large Scale Ground Settlement	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	30	Emanating Odour	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	31	Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Legend: A+/-: Significant positive/negative impact is expected.
B+/-: Relatively positive/negative impact is expected.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D : No or Negligible impact is expected.

(2) Green Line

1) Pre-construction Stage

No impact is expected in pre-construction stage.

2) During the Construction Period

Some negative impacts of air pollution, noise and vibration are expected due to operation of heavy equipment/vehicles as well as traffic jams incidental to construction works, although this impact will be temporary during the construction stage. There is no remarkable significant and/or sensitive natural environment along the corridor since proposed corridor is located in urban areas. Although negative impacts are not expected on the natural flora, fauna and biodiversity to be protected, there is a possibility of clearing trees planted on the roadside/center of the road in the area of the stations and elevated structures as well as the inderground sections. North Karachi and North Nazimabad areas are particularly receiving heavy impacts. Where underground sections are constructed, the possibilities of the negative impact for groundwater or ground subsidence are undeniable. However, it depends much on the construction method as well as the ground conditions. There are no project components or activities, which causes the soil contamination. However, in the case of construction site is already contaminated by other reasons, the construction will receive negative impacts. Where the corridor is crossing over Lyari River, there is a possibility of water pollution generated by bridge construction activities, although the expected impacts will be temporary during construction stage.

3) Operation and Maintenance Stage

It is expected that emission of air pollutions and noise level will be reduced due to the modal shift of transportation from passenger cars to the LRT system.

Table A5-3-2a Draft Scoping on the Environmental and Social Considerations – Zero Option–

Item	Project Stage	Evalua-tion	Description
Social Environment			
Involuntary Resettlement	P	C-	Stakeholder meetings are scheduled to hold in order to disseminate information this route. It should agitate anxiety of the local residents if they would become subject to resettlement as a result of project implementation.
	C	B-	Where underground sections are constructed, entrances/exits should be constructed. In the case elevated stations are constructed, stairways to the station are constructed. As a result portions of residential/commercial areas might become subject to land acquisition. Although limited, a number of residents/shop owners might be involved in the resettlement scheme.
	O	D	There is no resettlement involved in the operation stage of the project.
Disruption or Improvement of Livelihood	P	D	No significant impact is expected.
	C	B-	Due to noise and vibration caused by the construction activities, livelihood of the general public along the construction area should be negatively affected.
	O	C+/-	There are periodical noise and vibration during the operation stage of the passenger trains. On the other hand, convenience of passenger trains should improve commercial activities or commuting to work of the local population along the corridors.
Changes in the Employment and Local Economic	P	D	No impact is expected in pre-construction stage.
	C	C+	Some positive effect on the local economy is expected because of the possible increment of business/employment opportunities

Item	Project Stage	Evaluation	Description
Conditions			generated by construction activities of the project.
	O	B+	Limited but positive effect on the local economy is expected because of possible increment of business/employment opportunities generated by the operation of passenger trains.
Changes on the Land Use Patterns	P	D	No impact is expected in pre-construction stage.
	C	B-	Extent of changing the land use during the construction stage is expected to be negligible. However, in the congested areas, diversion of traffic is necessary i.e. a change of the land use patterns of limited urban areas should take place to a limited extent.
	O	C+/-	As a result of the construction of this corridor, limited area of urban land use patterns should be changed to a limited extent. There is no project components or activities, which should cause changes of land use patterns during the operation stage.
Physical Division of the Local Communities	P	D	No impact is expected during the pre-construction stage.
	C,O	D	Since the alignment of corridor is made along the existing trunk roads, no significant part of the local community would be divided by the Project.
Existing Social Infrastructure and Services	P	D	No impact is expected in pre-construction stage.
	C	B-	There are large negative impacts on the traffic, as road diversion should be made where construction works take place i.e. road traffic as vital infrastructure for the general public is disrupted to some extent. Thus significant economic activities are negatively disrupted. Impacts of such disruption are however limited to the construction period only.
	O	B+	Improvement of the urban infrastructure through the project should be made to a large extent upon completion of the Project.
Indigenous and Ethnic Minorities	P,C,O	D	There are no indigenous and ethnic minorities affected by the Project.
Distribution of Benefits	P,C	C-	The feeling of inequality among the stakeholders might cause anxiety since those in the vicinity of stations would receive benefit from the Project than others.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Local Conflict on the Interests of the Project	P,C	B-	The feeling of inequality among the local residents might cause anxiety since those away from the stations would try to bring stations in their communities.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Disruption of Water Right or Common Land	P,C,O	D	No impact on water use or water right is expected due to the project implementation.
Public Sanitation	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on the local sanitary conditions are expected due to the mobilization of workforce. Expected impacts will be temporary during the construction stage only.
	O	D	There will be no disruption of public sanitation as a result of the operation of the passenger trains.
Risks on the Hazardous and Infectious Diseases	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks are probably expected on infectious diseases among the construction workforce as well as the general public along the corridors during the construction period because of dust

Item	Project Stage	Evaluation	Description
			emanated from the construction areas. It is limited to the constriction period only.
	O	D	Operation of the Project should not be the cause of the risks on the infectious diseases.
Accidents	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks of accidents is expected due to the operation of heavy equipment and heavy vehicles during the construction stage.
	O	B-	Increment of risks of accidents is expected due to the train services in the operation stage.
Cultural Heritage	P,C	B-	There are a number of cultural assets likely affected in downtown area of Corridor 1 and 2 during the construction stage. Although small portions, some of the buildings constructed during the colonial period may need to reconstruct where stations are constructed.
	O	D	There are no project components or activities that may cause the negative impacts on cultural heritage in operation stage.
Natural Environment and Pollution			
Geographical and geological conditions	P,C,O	D	It is not expected that the Project will bring about the significant change or impacts on geographical and geological conditions, since the most of the Project alignment is designed on/under the existing road.
Soil erosion	P,C,O	D	It is not expected that the Project will cause the soil erosion, since the most of the Project alignment is designed on/under the existing road
Ground Water	C	C-	The turbid water generated by cut-and-cover works for station construction at underground section of the corridor would cause some impacts on groundwater quality.
	P, O	D	It is not expected that the Project will cause the serious impacts on groundwater artery/ quality in pre-construction and operation stages.
Surface Water	P,C,O	D	There is no project component or activity which would cause the significant change or impacts on hydrological conditions in and around the Project area.
Coastal zone	P,C,O	D	There are no coastal zones in and around the Project area.
Oceanographic changes	P,C,O	D	There is no project component or activity, which would cause the significant change or impacts on Oceanographic conditions in and around the Project area.
Flora	C	B-	There is a possibility of clearing trees in the area of the stations and equipments for new transportation system since there are a lot of tree planting on the existing road center divider or roadside.
	P, O	D	Negative impacts are not expected on the natural flora, since the most of the Project alignment is designed in developed urban area and out of protected areas.
Fauna	P,C,O	D	Negative impacts are not expected on the fauna and biodiversity to be protected, since the most of the Project alignment is designed in developed urban area and out of protected areas.
Natural/Ecological reserves and sanctuary	P,C,O	D	Negative impacts are not expected, since the Project alignment is designed in developed urban area and out of natural/ecological reserves and sanctuary.
Meteorology	P,C,O	D	It is not expected that the Project will cause the significant change on the regional meteorological condition.
Global warming	P	D	No impact is expected in pre-construction stage.
	C	B-	The possibility of increased Greenhouse Gas (GHG) emission is expected due to the operation of heavy vehicles as well as traffic jam incidental to the construction works, although the expected probability will be temporary during the construction stage.
	O	B+	It is expected that the GHG emission would be reduced due to the

Item	Project Stage	Evaluation	Description
			modal shifting of transportation from passenger cars/ buses to the new transportation system.
Air pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on air quality are expected due to operation of heavy equipment/ vehicles as well as traffic jam incidental to construction works, although the expected impacts will be temporary during the construction stage
	O	B+	It is expected that emission of air pollutants will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Water pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts on water quality would be caused by the turbid water generated from construction yards of cut-and-cover works or bridge construction activities as well as by the effluent generated from workers' campsite, although the expected impacts will be temporary during construction stage.
	O	D	The facilities associated to the new transportation system will be operated according to the Pakistan regulations and guidelines related to managing the wastewater or effluent. Therefore, it is not expected to bring about the serious impacts on water quality in operation stage.
Soil contamination	C	C-	There are no project components or activities, which cause the soil contamination. However, in case that the soil at the construction sites is already contaminated by other reasons, the construction activity of the Project may cause the negative impacts.
	P,O	D	There are no project components or activities, which cause the soil contamination in pre-construction and operation stages.
Waste	P	D	No impact is expected in pre-construction stage.
	C	B-	It is expected that the Project will generate the construction waste in the construction stage.
	O	D	The waste generated from the facilities associated to the new transportation system will be managed according to the Pakistan regulations and guidelines concerned, then it is not expected to cause the serious impacts.
Noise and vibration	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts of noise and vibration are expected due to the operation of the heavy equipment/ vehicles, although the expected impacts will be temporary during the construction stage.
	O	B+/-	It is expected that emission of noise and vibration will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system. On the other hand, some impacts of noise and vibration are expected due to the train services in the operation stage, especially in the at-grade/ viaduct sections.
Ground subsidence	C	C-	The probability of ground subsidence is undeniable and dependent on the construction method to be employed and ground conditions. Further examination would be necessary according to the construction plan and findings of ground conditions.
	P,O	D	There are no project components or activities that may cause the ground subsidence in pre-construction and operation stages.
Emanating odor	P,C,O	D	There are no project components or activities that may cause the offensive odor.
Bottom sediment	P,C,O	D	There are no project components or activities that may cause the negative impacts on bottom sediment.

Table A5-3-2b Draft Scoping Matrix on the Environmental and Social Considerations –Green Line–

	No.	Items of the Environment Subject to Negative/Positive Changes / Project Activities	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage									Operation Stage					
				Survey/Study on the Project	Information on the Project	Participation to the SH Meeting	Land Acquisition and Resettlement	Clearing Vegetation/Top Soil for Preparation of the Construction Works	Earth Moving: Cutting and Filling of the Construction Works	Preparation of the Construction Areas, Work Camp and Mobilization of Construction Plants and Materials	Diversion of the Existing Road	Construction Works for Stations and Entrances on the Sidewalks/Road/Privately Owned Land	Emanation of Dust, Noise and Vibration	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works	Improvement of Traffic Congestions	Improvement of Railway/Bus Stations and Other Facilities	Improvement of Road/Railway Safety	Improvement of Employment Opportunities	Improvement of Passenger-oriented Business	Improvement of Freight-oriented Business
Social Environment	1	Effects on the Livelihood of the Local Communities																			
		a. General	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	C+	C+	B+	B+	B+	C+	C+	C+
		b. Socially and Physically Disadvantaged	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		c. Women and Children	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		d. Ethnic Minority	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	2	Social Cohesion and Physical Continuity of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	3	Local Road Transportation System	C+	D	D	D	D	D	D	D	B-	D	D	D	D	B+	C+	C+	D	D	D
	4	Distribution of the Benefit of the Project	B+	D	D	D	D	D	D	D	D	D	D	D	D	A+	B+	B+	B+	C+	D
	5	Effect on the Social and Cultural Events and Tradition	C+	D	D	D	D	D	D	D	C-	D	C-	C+	C+	B+	D	D	D	D	D
	6	Effect on the Local Economic Activities																			
		a. Industrial Areas	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
		b. Commercial and Busines Areas	C+	D	D	D	C-	D	C-	D	C-	C-	C-	C+	C+	B+	C+	C+	B+	B+	C+
	7	Effect on the Water Rights/Commons for Grazing etc.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	8	Public Hygiene and Health Care of the Local Communities	C-	D	D	D	D	D	D	C-	D	D	B-	D	D	D	D	D	D	D	D
	9	Vulnerability/Resilience of the Society to Natural Disaster	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	10	Traffic Safety	B+	D	D	D	D	D	C-	D	C-	C-	D	D	D	B+	B+	B+	D	D	D
	11	Changes on the Land Use and the Landscape	C+/-	D	D	D	C-	D	C-	C-	C-	D	D	D	D	D	D	C+/-	D	D	D
Natural Environment	12	Geographical Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	13	Geological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	14	Soil Erosion	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	15	Faunal Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	16	Flora Ecology	B-	D	D	D	D	B-	D	C-	D	D	D	D	D	D	D	D	D	D	D
	17	Effects on the Ground Water	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	18	Effect on the Surface Water Body (River, Lakes, etc)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	19	Effect on the Coastal Environment	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	20	Oceanographic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	21	Effect on the Natural/Ecological Reserves and Sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	22	Localised Climatic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	23	Effect on the Global Warming Issues	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
Pollution	24	Air Pollution	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
	25	Water Pollution	B-	D	D	D	D	D	B-	B-	D	D	D	D	D	D	D	D	D	D	D
	26	Soil Pollution	C-	D	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D
	27	Solid Waste and/or Industrial Discharge Management	B-	D	D	D	D	B-	B-	B-	D	B-	D	D	D	D	D	D	D	D	D
	28	Noise and Vibration	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+/-	D	D	D	D	D
	29	Large Scale Ground Settlement	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	30	Emanating Odour	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	31	Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Legend: A+/-: Significant positive/negative impact or change is expected.
B+/-: Relatively positive/negative impact or change is expected.
C+/-: Extent of positive/negative impact or change is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D : No or Negligible impact is expected.

(3) Brown Line

1) Pre-construction Stage

No impact is expected in pre-construction stage.

2) During the Construction Period

Some negative impacts of air pollution, noise and vibration are expected due to operation of heavy construction equipment/vehicles as well as traffic jams where construction works take place. These impacts will be temporary during the construction stage only. There is no remarkable and significant natural environment that will receive impacts since proposed corridors are located in the heavily built-up urban areas. Although negative impacts are not expected on the natural flora, fauna and biodiversity necessary to protect, there is a possibility of clearing trees planted on the roadside/center of the road in the area of the stations and elevated sections of Brown Line. Gulshan area will especially receive heavy impacts on the trees planted along the road. Where underground sections are constructed, the possibilities of negative impacts for groundwater or ground subsidence are undeniable. It however depends much on the construction method as well as on ground conditions. There are no project components or activities, which cause the soil contamination. However, in the case of construction site already contaminated by other reasons, the construction workers should face negative impact. Where the corridor is crossing over Malir River and Lyari River, there is a possibility of water pollution generated by bridge construction activities, although the expected impacts will be temporary during construction stage.

3) Operation and Maintenance Stage

It is expected that emission of air pollutions and noise level will be reduced due to the modal shift of transportation from passenger cars to the new LRT system.

Table A5-3-3a Draft Scoping on the Environmental and Social Considerations – Brown Line–

Item	Project Stage	Evalua-tion	Description
Social Environment			
Involuntary Resettlement	P	C-	Stakeholder meetings are scheduled to hold in order to disseminate information this route. It should agitate anxiety of the local residents if they would become subject to resettlement as a result of project implementation.
	C	B-	Where underground sections are constructed, entrances/exits should be constructed. In the case elevated stations are constructed, stairways to the station are constructed. Where the corridor crossing over Malir River, portions of agricultural areas are subject to land acquisition. As a result portions of residential/commercial areas might become subject to land acquisition. Although limited, a number of residents/shop owners might be involved in the resettlement scheme.
	O	D	There is no resettlement involved in the operation stage of the project.
Disruption or Improvement of Livelihood	P	D	No significant impact is expected.
	C	B-	Due to noise and vibration caused by the construction activities, livelihood of the general public along the construction area should be negatively affected.
	O	C+/-	There are periodical noise and vibration during the operation stage of the passenger trains. On the other hand, convenience of passenger trains should improve commercial activities or

Item	Project Stage	Evaluation	Description
			commuting to work of the local population along the corridors. Some of the agricultural landowners along Malir River will lose portions of their agricultural area.
Changes in the Employment and Local Economic Conditions	P	D	No impact is expected in pre-construction stage.
	C	C+	Some positive effect on the local economy is expected because of the possible increment of business/employment opportunities generated by construction activities of the project.
	O	B+	Limited but positive effect on the local economy is expected because of possible increment of business/employment opportunities generated by the operation of passenger trains.
Changes on the Land Use Patterns	P	D	No impact is expected in pre-construction stage.
	C	B-	Extent of changing the land use during the construction stage is expected to be negligible. However, in the congested areas, diversion of traffic is necessary i.e. a change of the land use patterns of limited urban areas should take place to a limited extent.
	O	C+/-	As a result of the construction of this corridor, limited area of agricultural land use patterns on both side of Malir River should change to a limited extent. There is no other project components or activities, which should cause changes of land use patterns during the operation stage.
Physical Division of the Local Communities	P	D	No impact is expected during the pre-construction stage.
	C,O	D	Since the alignment of corridor is made along the existing trunk roads, no significant part of the local community would be divided by the Project.
Existing Social Infrastructure and Services	P	D	No impact is expected in pre-construction stage.
	C	B-	There are large negative impacts on the traffic, as road diversion should be made where construction works take place i.e. road traffic as vital infrastructure for the general public is disrupted to some extent. Thus significant economic activities are negatively disrupted. Impacts of such disruption are however limited to the construction period only.
	O	B+	Improvement of the urban infrastructure through the project should be made to a large extent upon completion of the Project.
Indigenous and Ethnic Minorities	P,C,O	D	There are no indigenous and ethnic minorities affected by the Project.
Distribution of Benefits	P,C	C-	The feeling of inequality among the stakeholders might cause anxiety since those in the vicinity of stations would receive benefit from the Project than others.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Local Conflict on the Interests of the Project	P,C	B-	The feeling of inequality among the local residents might cause anxiety since those away from the stations would try to bring stations in their communities.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Disruption of Water Right or Common Land	P,C,O	D	No impact on water use or water right is expected due to the project implementation.
Public Sanitation	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on the local sanitary conditions are expected due to the mobilization of workforce. Expected impacts

Item	Project Stage	Evaluation	Description
			will be temporary during the construction stage only.
	O	D	There will be no disruption of public sanitation as a result of the operation of the passenger trains.
Risks on the Hazardous and Infectious Diseases	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks are probably expected on infectious diseases among the construction workforce as well as the general public along the corridors during the construction period because of dust emanated from the construction areas. It is limited to the constriction period only.
	O	D	Operation of the Project should not be the cause of the risks on the infectious diseases.
Accidents	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks of accidents is expected due to the operation of heavy equipment and heavy vehicles during the construction stage.
	O	B-	Increment of risks of accidents is expected due to the train services in the operation stage.
Cultural Heritage	P,C	B-	There are a number of cultural assets likely affected in downtown area of Corridor 1 and 2 during the construction stage. Although small portions, some of the buildings constructed during the colonial period may need to reconstruct where stations are constructed.
	O	D	There are no project components or activities that may cause the negative impacts on cultural heritage in operation stage.
Natural Environment and Pollution			
Geographical and geological conditions	P,C,O	D	It is not expected that the Project will bring about the significant change or impacts on geographical and geological conditions, since the most of the Project alignment is designed on/under the existing road.
Soil erosion	P,C,O	D	It is not expected that the Project will cause the soil erosion, since the most of the Project alignment is designed on/under the existing road
Ground Water	C	C-	Some impacts on groundwater quality would be caused by the turbid water generated by cut-and-cover works for station construction.
	P, O	D	It is not expected that the Project will cause the serious impacts on groundwater artery/ quality in pre-construction and operation stages.
Surface Water	P,C,O	D	There is no project component or activity which would cause the significant change or impacts on hydrological conditions in and around the Project area.
Coastal zone	P,C,O	D	There are no coastal zones in and around the Project area.
Oceanographic changes	P,C,O	D	There is no project component or activity which would cause the significant change or impacts on Oceanographic conditions in and around the Project area.
Flora	C	B-	There is a possibility of clearing trees in the area of the stations and equipments for new transportation system since there are a lot of tree planting on the existing road center divider or roadside.
	P, O	D	Negative impacts are not expected on the natural flora, since the most of the Project alignment is designed in developed urban area and out of protected areas.
Fauna	P,C,O	D	Negative impacts are not expected on the fauna and biodiversity to be protected, since the most of the Project alignment is designed in developed urban area and out of protected areas.

Item	Project Stage	Evaluation	Description
Natural/Ecological reserves and sanctuary	P,C,O	D	Negative impacts are not expected, since the Project alignment is designed in developed urban area and out of natural/ecological reserves and sanctuary.
Meteorology	P,C,O	D	It is not expected that the Project will cause the significant change on the regional meteorological condition.
Global warming	P	D	No impact is expected in pre-construction stage.
	C	B-	The possibility of increased Greenhouse Gas (GHG) emission is expected due to the operation of heavy vehicles as well as traffic jam incidental to the construction works, although the expected probability will be temporary during the construction stage.
	O	B+	It is expected that the GHG emission would be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Air pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on air quality are expected due to operation of heavy equipment/ vehicles as well as traffic jam incidental to construction works, although the expected impacts will be temporary during the construction stage
	O	B+	It is expected that emission of air pollutants will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Water pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts on water quality would be caused by the turbid water generated from construction yards of cut-and-cover works or bridge construction activities as well as by the effluent generated from workers' camp sites, although the expected impacts will be temporary during construction stage.
	O	D	The facilities associated to the new transportation system will be operated according to the Pakistan regulations and guidelines related to managing the wastewater or effluent. Therefore, it is not expected to bring about the serious impacts on water quality in operation stage.
Soil contamination	C	C-	There are no project components or activities which cause the soil contamination. However, in case that the soil at the construction sites is already contaminated by other reasons, the construction activity of the Project may cause the negative impacts.
	P,O	D	There are no project components or activities which cause the soil contamination in pre-construction and operation stages.
Waste	P	D	No impact is expected in pre-construction stage.
	C	B-	It is expected that the Project will generate the construction waste in the construction stage.
	O	D	The waste generated from the facilities associated to the new transportation system will be managed according to the Pakistan regulations and guidelines concerned, then it is not expected to cause the serious impacts.
Noise and vibration	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts of noise and vibration are expected due to the operation of the heavy equipment/ vehicles, although the expected impacts will be temporary during the construction stage.
	O	B+/-	It is expected that emission of noise and vibration will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system. On the other hand, some impacts of noise and vibration are expected due to the train services in the operation stage, especially in the at-grade/ viaduct sections.

Item	Project Stage	Evaluation	Description
Ground subsidence	C	C-	The probability of ground subsidence is undeniable and dependent on the construction method to be employed and ground conditions. Further examination would be necessary according to the construction plan and findings of ground conditions.
	P,O	D	There are no project components or activities that may cause the ground subsidence in pre-construction and operation stages.
Emanating odor	P,C,O	D	There are no project components or activities that may cause the offensive odor.
Bottom sediment	P,C,O	D	There are no project components or activities that may cause the negative impacts on bottom sediment.

Table A5-3-3b Draft Scoping Matrix on the Environmental and Social Considerations –Brown Line–

	No.	Items of the Environment Subject to Negative/Positive Changes / Project Activities	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage									Operation Stage					
				Survey/Study on the Project	Information on the Project	Participation to the SH Meeting	Land Acquisition and Resettlement	Clearing Vegetation/Top Soil for Preparation of the Construction Works	Earth Moving: Cutting and Filling of the Construction Works	Preparation of the Construction Areas, Work Camp and Mobilization of Construction Plants and Materials	Diversion of the Existing Road	Construction Works for Stations and Entrances on the Sidewalks/Road/Privately Owned Land	Emanation of Dust, Noise and Vibration	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works	Improvement of Traffic Congestions	Improvement of Railway/Bus Stations and Other Facilities	Improvement of Road/Railway Safety	Improvement of Employment Opportunities	Improvement of Passenger-oriented Business	Improvement of Freight-oriented Business
Social Environment	1	Effects on the Livelihood of the Local Communities																			
		a. General	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	C+	C+	B+	B+	B+	C+	C+	C+
		b. Socially and Physically Disadvantaged	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		c. Women and Children	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		d. Ethnic Minority	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	2	Social Cohesion and Physical Continuity of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	3	Local Road Transportation System	C+	D	D	D	D	D	D	D	B-	D	D	D	D	B+	C+	C+	D	D	D
	4	Distribution of the Benefit of the Project	B+	D	D	D	D	D	D	D	D	D	D	D	D	A+	B+	B+	B+	C+	D
	5	Effect on the Social and Cultural Events and Tradition	C+	D	D	D	D	D	D	D	C-	D	C-	C+	C+	B+	D	D	D	D	D
	6	Effect on the Local Economic Activities																			
		a. Industrial Areas	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
		b. Commercial and Busines Areas	C+	D	D	D	C-	D	C-	D	C-	C-	C-	C+	C+	B+	C+	C+	B+	B+	C+
	7	Effect on the Water Rights/Commons for Grazing etc.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	8	Public Hygiene and Health Care of the Local Communities	C-	D	D	D	D	D	D	C-	D	D	B-	D	D	D	D	D	D	D	D
	9	Vulnerability/Resilience of the Society to Natural Disaster	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	10	Traffic Safety	B+	D	D	D	D	D	C-	D	C-	C-	D	D	D	B+	B+	B+	D	D	D
	11	Changes on the Land Use and the Landscape	C+/-	D	D	D	C-	D	C-	C-	C-	D	D	D	D	D	D	C+/-	D	D	D
Natural Environment	12	Geographical Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	13	Geological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	14	Soil Erosion	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	15	Faunal Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	16	Flora Ecology	B-	D	D	D	D	B-	D	C-	D	D	D	D	D	D	D	D	D	D	D
	17	Effects on the Ground Water	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	18	Effect on the Surface Water Body (River, Lakes, etc)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	19	Effect on the Coastal Environment	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	20	Oceanographic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	21	Effect on the Natural/Ecological Reserves and Sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	22	Localised Climatic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	23	Effect on the Global Warming Issues	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
Pollution	24	Air Pollution	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
	25	Water Pollution	B-	D	D	D	D	D	B-	B-	D	D	D	D	D	D	D	D	D	D	D
	26	Soil Pollution	C-	D	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D
	27	Solid Waste and/or Industrial Discharge Management	B-	D	D	D	D	B-	B-	B-	D	B-	D	D	D	D	D	D	D	D	D
	28	Noise and Vibration	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+/-	D	D	D	D	D
	29	Large Scale Ground Settlement	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	30	Emanating Odour	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	31	Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Legend: A+/-: Significant positive/negative impact is expected.
B+/-: Relatively positive/negative impact is expected.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D : No or Negligible impact is expected.

(4) Red Line

1) Pre-construction Stage

No impact is expected in pre-construction stage.

2) During the Construction Period

Some negative impacts of air pollution, noise and vibration are expected due to operation of heavy construction equipment/vehicles. Traffic jams at the diversion of the existing road due to construction works are also expected although these impacts will be temporary during the construction stage only. There is no remarkable and significant natural environment that will receive impacts since proposed corridors are located in the heavily built-up urban areas. Although negative impacts are not expected on the natural flora, fauna and biodiversity necessary to protect, there is a possibility of clearing trees planted on the roadside/center of the road in the area of the stations and elevated sections of Red Line. University Road area should receive particularly heavy impacts. Where underground sections are constructed, the possibilities of the negative impact for groundwater or ground subsidence are undeniable. It however depends on the construction method as well as on the ground conditions. There are no project components or activities, which cause soil contamination. However, in the case construction site is already contaminated by other reasons, the construction workers should face negative impacts.

3) Operation and Maintenance Stage

It is expected that emission of air pollutions and noise level will be reduced due to the modal shift of transportation from passenger cars to LRT system.

Table A5-3-4a Draft Scoping on the Environmental and Social Considerations – Red Line–

Item	Project Stage	Evalua-tion	Description
Social Environment			
Involuntary Resettlement	P	C-	Stakeholder meetings are scheduled to hold in order to disseminate information this route. It should agitate anxiety of the local residents if they would become subject to resettlement as a result of project implementation.
	C	B-	Where underground sections are constructed, entrances/exits should be constructed. In the case elevated stations are constructed, stairways to the station are constructed. As a result portions of residential/commercial areas might become subject to land acquisition. Although limited, a number of residents/shop owners might be involved in the resettlement scheme.
	O	D	There is no resettlement involved in the operation stage of the project.
Disruption or Improvement of Livelihood	P	D	No significant impact is expected.
	C	B-	Due to noise and vibration caused by the construction activities, livelihood of the general public along the construction area should be negatively affected.
	O	C+/-	There are periodical noise and vibration during the operation stage of the passenger trains. On the other hand, convenience of passenger trains should improve commercial activities or commuting to work of the local population along the corridors.
Changes in the Employment and Local Economic	P	D	No impact is expected in pre-construction stage.
	C	C+	Some positive effect on the local economy is expected because of the possible increment of business/employment opportunities

Item	Project Stage	Evaluation	Description
Conditions			generated by construction activities of the project.
	O	B+	Limited but positive effect on the local economy is expected because of possible increment of business/employment opportunities generated by the operation of passenger trains.
Changes on the Land Use Patterns	P	D	No impact is expected in pre-construction stage.
	C	B-	Extent of changing the land use during the construction stage is expected to be negligible. However, in the congested areas, diversion of traffic is necessary i.e. a change of the land use patterns of limited urban areas should take place to a limited extent.
	O	C+/-	As a result of the construction of this corridor, limited area of urban land use patterns should be changed to a limited extent. There is no project components or activities, which should cause changes of land use patterns during the operation stage.
Physical Division of the Local Communities	P	D	No impact is expected during the pre-construction stage.
	C,O	D	Since the alignment of corridor is made along the existing trunk roads, no significant part of the local community would be divided by the Project.
Existing Social Infrastructure and Services	P	D	No impact is expected in pre-construction stage.
	C	B-	There are large negative impacts on the traffic, as road diversion should be made where construction works take place i.e. road traffic as vital infrastructure for the general public is disrupted to some extent. Thus significant economic activities are negatively disrupted. Impacts of such disruption are however limited to the construction period only.
	O	B+	Improvement of the urban infrastructure through the project should be made to a large extent upon completion of the Project.
Indigenous and Ethnic Minorities	P,C,O	D	There are no indigenous and ethnic minorities affected by the Project.
Distribution of Benefits	P,C	C-	The feeling of inequality among the stakeholders might cause anxiety since those in the vicinity of stations would receive benefit from the Project than others.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Local Conflict on the Interests of the Project	P,C	B-	The feeling of inequality among the local residents might cause anxiety since those away from the stations would try to bring stations in their communities.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Disruption of Water Right or Common Land	P,C,O	D	No impact on water use or water right is expected due to the project implementation.
Public Sanitation	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on the local sanitary conditions are expected due to the mobilization of workforce. Expected impacts will be temporary during the construction stage only.
	O	D	There will be no disruption of public sanitation as a result of the operation of the passenger trains.
Risks on the Hazardous and Infectious Diseases	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks are probably expected on infectious diseases among the construction workforce as well as the general public along the corridors during the construction period because of dust

Item	Project Stage	Evaluation	Description
			emanated from the construction areas. It is limited to the constriction period only.
	O	D	Operation of the Project should not be the cause of the risks on the infectious diseases.
Accidents	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks of accidents is expected due to the operation of heavy equipment and heavy vehicles during the construction stage.
	O	B-	Increment of risks of accidents is expected due to the train services in the operation stage.
Cultural Heritage	P,C	B-	There are a number of cultural assets likely affected in downtown area of Corridor 1 and 2 during the construction stage. Although small portions, some of the buildings constructed during the colonial period may need to reconstruct where stations are constructed.
	O	D	There are no project components or activities that may cause the negative impacts on cultural heritage in operation stage.
Natural Environment and Pollution			
Geographical and geological conditions	P,C,O	D	It is not expected that the Project will bring about the significant change or impacts on geographical and geological conditions, since the most of the Project alignment is designed on/under the existing road.
Soil erosion	P,C,O	D	It is not expected that the Project will cause the soil erosion, since the most of the Project alignment is designed on/under the existing road
Ground Water	C	C-	The turbid water generated by cut-and-cover works for station construction at underground section of the corridor would cause some impacts on groundwater quality.
	P, O	D	It is not expected that the Project will cause the serious impacts on groundwater artery/ quality in pre-construction and operation stages.
Surface Water	P,C,O	D	There is no project component or activity which would cause the significant change or impacts on hydrological conditions in and around the Project area.
Coastal zone	P,C,O	D	There are no coastal zones in and around the Project area.
Oceanographic changes	P,C,O	D	There is no project component or activity which would cause the significant change or impacts on Oceanographic conditions in and around the Project area.
Flora	C	B-	There is a possibility of clearing trees in the area of the stations and equipments for new transportation system since there are a lot of tree planting on the existing road center divider or roadside.
	P, O	D	Negative impacts are not expected on the natural flora, since the most of the Project alignment is designed in developed urban area and out of protected areas.
Fauna	P,C,O	D	Negative impacts are not expected on the fauna and biodiversity to be protected, since the most of the Project alignment is designed in developed urban area and out of protected areas.
Natural/Ecological reserves and sanctuary	P,C,O	D	Negative impacts are not expected, since the Project alignment is designed in developed urban area and out of natural/ecological reserves and sanctuary.
Meteorology	P,C,O	D	It is not expected that the Project will cause the significant change on the regional meteorological condition.
Global warming	P	D	No impact is expected in pre-construction stage.
	C	B-	The possibility of increased Greenhouse Gas (GHG) emission is expected due to the operation of heavy vehicles as well as traffic jam incidental to the construction works, although the expected probability will be temporary during the construction stage.

Item	Project Stage	Evaluation	Description
	O	B+	It is expected that the GHG emission would be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Air pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on air quality are expected due to operation of heavy equipment/ vehicles as well as traffic jam incidental to construction works, although the expected impacts will be temporary during the construction stage
	O	B+	It is expected that emission of air pollutants will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Water pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts on water quality would be caused by the turbid water generated from construction yards of cut-and-cover works as well as by the effluent generated from workers' campsites, although the expected impacts will be temporary during construction stage.
	O	D	The facilities associated to the new transportation system will be operated according to the Pakistan regulations and guidelines related to managing the wastewater or effluent. Therefore, it is not expected to bring about the serious impacts on water quality in operation stage.
Soil contamination	C	C-	There are no project components or activities, which cause the soil contamination. However, in case that the soil at the construction sites is already contaminated by other reasons, the construction activity of the Project may cause the negative impacts.
	P,O	D	There are no project components or activities, which cause the soil contamination in pre-construction and operation stages.
Waste	P	D	No impact is expected in pre-construction stage.
	C	B-	It is expected that the Project will generate the construction waste in the construction stage.
	O	D	The waste generated from the facilities associated to the new transportation system will be managed according to the Pakistan regulations and guidelines concerned, then it is not expected to cause the serious impacts.
Noise and vibration	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts of noise and vibration are expected due to the operation of the heavy equipment/ vehicles, although the expected impacts will be temporary during the construction stage.
	O	B+/-	It is expected that emission of noise and vibration will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system. On the other hand, some impacts of noise and vibration are expected due to the train services in the operation stage, especially in the at-grade/ viaduct sections.
Ground subsidence	C	C-	The probability of ground subsidence is undeniable and dependent on the construction method to be employed and ground conditions. Further examination would be necessary according to the construction plan and findings of ground conditions.
	P,O	D	There are no project components or activities that may cause the ground subsidence in pre-construction and operation stages.
Emanating odor	P,C,O	D	There are no project components or activities that may cause the offensive odor.
Bottom sediment	P,C,O	D	There are no project components or activities that may cause the negative impacts on bottom sediment.

Table A5-3-4b Draft Scoping Matrix on the Environmental and Social Considerations –Red Line–

	No.	Items of the Environment Subject to Negative/Positive Changes / Project Activities	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage									Operation Stage					
				Survey/Study on the Project	Information on the Project	Participation to the SH Meeting	Land Acquisition and Resettlement	Clearing Vegetation/Top Soil for Preparation of the Construction Works	Earth Moving: Cutting and Filling of the Construction Works	Preparation of the Construction Areas, Work Camp and Mobilization of Construction Plants and Materials	Diversion of the Existing Road	Construction Works for Stations and Entrances on the Sidewalks/Road/Privately Owned Land	Emanation of Dust, Noise and Vibration	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works	Improvement of Traffic Congestions	Improvement of Railway/Bus Stations and Other Facilities	Improvement of Road/Railway Safety	Improvement of Employment Opportunities	Improvement of Passenger-oriented Business	Improvement of Freight-oriented Business
Social Environment	1	Effects on the Livelihood of the Local Communities																			
		a. General	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	C+	C+	B+	B+	B+	C+	C+	C+
		b. Socially and Physically Disadvantaged	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		c. Women and Children	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		d. Ethnic Minority	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	2	Social Cohesion and Physical Continuity of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	3	Local Road Transportation System	C+	D	D	D	D	D	D	D	B-	D	D	D	D	B+	C+	C+	D	D	D
	4	Distribution of the Benefit of the Project	B+	D	D	D	D	D	D	D	D	D	D	D	D	A+	B+	B+	B+	C+	D
	5	Effect on the Social and Cultural Events and Tradition	C+	D	D	D	D	D	D	D	C-	D	C-	C+	C+	B+	D	D	D	D	D
	6	Effect on the Local Economic Activities																			
		a. Industrial Areas	C+	D	D	D	D	D	D	D	C-	C-	D	D	D	C+	D	D	C+	C+	D
		b. Commercial and Busines Areas	C+	D	D	D	C-	D	C-	D	C-	C-	C-	C+	C+	B+	C+	C+	B+	B+	C+
	7	Effect on the Water Rights/Commons for Grazing etc.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	8	Public Hygiene and Health Care of the Local Communities	C-	D	D	D	D	D	D	C-	D	D	B-	D	D	D	D	D	D	D	D
	9	Vulnerability/Resilience of the Society to Natural Disaster	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	10	Traffic Safety	B+	D	D	D	D	D	C-	D	C-	C-	D	D	D	B+	B+	B+	D	D	D
	11	Changes on the Land Use and the Landscape	C+/-	D	D	D	C-	D	C-	C-	C-	D	D	D	D	D	D	C+/-	D	D	D
Natural Environment	12	Geographical Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	13	Geological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	14	Soil Erosion	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	15	Faunal Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	16	Flora Ecology	B-	D	D	D	D	B-	D	C-	D	D	D	D	D	D	D	D	D	D	D
	17	Effects on the Ground Water	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	18	Effect on the Surface Water Body (River, Lakes, etc)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	19	Effect on the Coastal Environment	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	20	Oceanographic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	21	Effect on the Natural/Ecological Reserves and Sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	22	Localised Climatic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	23	Effect on the Global Warming Issues	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
Pollution	24	Air Pollution	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
	25	Water Pollution	B-	D	D	D	D	D	B-	B-	D	D	D	D	D	D	D	D	D	D	D
	26	Soil Pollution	C-	D	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D
	27	Solid Waste and/or Industrial Discharge Management	B-	D	D	D	D	B-	B-	B-	D	B-	D	D	D	D	D	D	D	D	D
	28	Noise and Vibration	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+/-	D	D	D	D	D
	29	Large Scale Ground Settlement	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	30	Emanating Odour	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	31	Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Legend: A+/-: Significant positive/negative impact is expected.
B+/-: Relatively positive/negative impact is expected.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D : No or Negligible impact is expected.

(5) Yellow Line

1) Pre-construction Stage

No impact is expected in pre-construction stage.

2) During the Construction Period

Some negative impacts of air pollution, noise and vibration are expected due to operation of heavy construction equipment/vehicles as well as traffic jams incidental to the construction areas as road diversion is made. However, these impacts will be temporary during the construction stage only. There is no remarkable and significant natural environment that will receive impacts since proposed corridors are located in the heavily built-up urban areas. Although negative impacts are not expected on the natural flora, fauna and biodiversity necessary to protect, there is a possibility of clearing trees planted on the roadside/center of the road in the area of the stations and elevated sections of Yellow Line. Where underground sections are constructed, the possibilities of the negative impact for groundwater or ground subsidence are undeniable. It depends however much on the construction method as well as on the ground conditions. There are no project components or activities, which cause the soil contamination. However, in the case of construction site is already contaminated by other reasons, the construction workers should face negative impacts. Where the corridor is crossing over Malir River, there is a possibility of water pollution by the turbid water generated by bridge construction activities, although the expected impacts will be temporary during construction stage.

3) Operation and Maintenance Stage

It is expected that emission of air pollutions and noise level will be reduced due to the modal shift of transportation from passenger cars to the new transportation.

Table A5-3-5a Draft Scoping on the Environmental and Social Considerations – Yellow Line–

Item	Project Stage	Evaluation	Description
Social Environment			
Involuntary Resettlement	P	C-	Stakeholder meetings are scheduled to hold in order to disseminate information this route. It should agitate anxiety of the local residents if they would become subject to resettlement as a result of project implementation.
	C	B-	Where underground sections are constructed, entrances/exits should be constructed. In the case elevated stations are constructed, stairways to the station are constructed. As a result portions of residential/commercial areas might become subject to land acquisition. Although limited, a number of residents/shop owners might be involved in the resettlement scheme.
	O	D	There is no resettlement involved in the operation stage of the project.
Disruption or Improvement of Livelihood	P	D	No significant impact is expected.
	C	B-	Due to noise and vibration caused by the construction activities, livelihood of the general public along the construction area should be negatively affected.
	O	C+/-	There are periodical noise and vibration during the operation stage of the passenger trains. On the other hand, convenience of passenger trains should improve commercial activities or commuting to work of the local population along the corridors.
Changes in the	P	D	No impact is expected in pre-construction stage.

Item	Project Stage	Evaluation	Description
Employment and Local Economic Conditions	C	C+	Some positive effect on the local economy is expected because of the possible increment of business/employment opportunities generated by construction activities of the project.
	O	B+	Limited but positive effect on the local economy is expected because of possible increment of business/employment opportunities generated by the operation of passenger trains.
Changes on the Land Use Patterns	P	D	No impact is expected in pre-construction stage.
	C	B-	Extent of changing the land use during the construction stage is expected to be negligible. However, in the congested areas, diversion of traffic is necessary i.e. a change of the land use patterns of limited urban areas should take place to a limited extent.
	O	C+/-	As a result of the construction of this corridor, limited area of urban land use patterns should be changed to a limited extent. There is no project components or activities, which should cause changes of land use patterns during the operation stage.
Physical Division of the Local Communities	P	D	No impact is expected during the pre-construction stage.
	C,O	D	Since the alignment of corridor is made along the existing trunk roads, no significant part of the local community would be divided by the Project.
Existing Social Infrastructure and Services	P	D	No impact is expected in pre-construction stage.
	C	B-	There are large negative impacts on the traffic, as road diversion should be made where construction works take place i.e. road traffic as vital infrastructure for the general public is disrupted to some extent. Thus significant economic activities are negatively disrupted. Impacts of such disruption are however limited to the construction period only.
	O	B+	Improvement of the urban infrastructure through the project should be made to a large extent upon completion of the Project.
Indigenous and Ethnic Minorities	P,C,O	D	There are no indigenous and ethnic minorities affected by the Project.
Distribution of Benefits	P,C	C-	The feeling of inequality among the stakeholders might cause anxiety since those in the vicinity of stations would receive benefit from the Project than others.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Local Conflict on the Interests of the Project	P,C	B-	The feeling of inequality among the local residents might cause anxiety since those away from the stations would try to bring stations in their communities.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Disruption of Water Right or Common Land	P,C,O	D	No impact on water use or water right is expected due to the project implementation.
Public Sanitation	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on the local sanitary conditions are expected due to the mobilization of workforce. Expected impacts will be temporary during the construction stage only.
	O	D	There will be no disruption of public sanitation as a result of the operation of the passenger trains.
Risks on the Hazardous and	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks are probably expected on infectious diseases

Item	Project Stage	Evaluation	Description
Infectious Diseases			among the construction workforce as well as the general public along the corridors during the construction period because of dust emanated from the construction areas. It is limited to the constriction period only.
	O	D	Operation of the Project should not be the cause of the risks on the infectious diseases.
Accidents	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks of accidents is expected due to the operation of heavy equipment and heavy vehicles during the construction stage.
	O	B-	Increment of risks of accidents is expected due to the train services in the operation stage.
Cultural Heritage	P,C	B-	There are a number of cultural assets likely affected in downtown area of Corridor 1 and 2 during the construction stage. Although small portions, some of the buildings constructed during the colonial period may need to reconstruct where stations are constructed.
	O	D	There are no project components or activities that may cause the negative impacts on cultural heritage in operation stage.
Natural Environment and Pollution			
Geographical and geological conditions	P,C,O	D	It is not expected that the Project will bring about the significant change or impacts on geographical and geological conditions, since the most of the Project alignment is designed on/under the existing road.
Soil erosion	P,C,O	D	It is not expected that the Project will cause the soil erosion, since the most of the Project alignment is designed on/under the existing road
Ground Water	C	C-	The turbid water generated by cut-and-cover works for station construction works at under ground section of the corridor would cause some impacts on groundwater quality.
	P, O	D	It is not expected that the Project will cause the serious impacts on groundwater artery/ quality in pre-construction and operation stages.
Surface Water	P,C,O	D	There is no project component causing significant change or impacts on hydrological conditions in and around the Project area.
Coastal zone	P,C,O	D	There are no coastal zones in and around the Project area.
Oceanographic changes	P,C,O	D	There is no project component causing significant changes or impacts on oceanographic conditions in and around the Project area.
Flora	C	B-	Clearing trees on greenbelt or roadside should take place.
	P, O	D	There is no impact on the significant natural flora.
Fauna	P,C,O	D	There is no impact on the significant natural fauna.
Natural/Ecological reserves and sanctuary	P,C,O	D	Negative impacts are not expected since the Project alignment is designed in developed urban area and out of natural/ecological reserves and sanctuary.
Meteorology	P,C,O	D	The Project will cause no significant change on the regional meteorological conditions.
Global warming	P	D	No impact is expected in pre-construction stage.
	C	B-	The possibility of increased Greenhouse Gas (GHG) emission is expected due to the operation of heavy vehicles as well as traffic jam incidental to the construction works, although the expected probability will be temporary during the construction stage.
	O	B+	It is expected that the GHG emission would be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Air pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on air quality are expected due to operation of heavy equipment/ vehicles as well as traffic jam incidental to

Item	Project Stage	Evaluation	Description
			construction works, although the expected impacts will be temporary during the construction stage
	O	B+	It is expected that emission of air pollutants will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Water pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts on water quality would be caused by the turbid water generated from construction yards of cut-and-cover works or bridge construction activities as well as by the effluent generated from workers' campsites, although the expected impacts will be temporary during construction stage.
	O	D	The facilities associated to the new transportation system will be operated according to the Pakistan regulations and guidelines related to managing the wastewater or effluent. Therefore, it is not expected to bring about the serious impacts on water quality in operation stage.
Soil contamination	C	C-	There are no project components or activities, which cause the soil contamination. However, in case that the soil at the construction sites is already contaminated by other reasons, the construction activity of the Project may cause the negative impacts.
	P,O	D	There are no project components or activities, which cause the soil contamination in pre-construction and operation stages.
Waste	P	D	No impact is expected in pre-construction stage.
	C	B-	It is expected that the Project will generate the construction waste in the construction stage.
	O	D	The waste generated from the facilities associated to the new transportation system will be managed according to the Pakistan regulations and guidelines concerned, then it is not expected to cause the serious impacts.
Noise and vibration	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts of noise and vibration are expected due to the operation of the heavy equipment/ vehicles, although the expected impacts will be temporary during the construction stage.
	O	B+/-	Emission of noise and vibration will be reduced due to the modal shifting of transportation from passenger cars/buses to the new transportation system. On the other hand, increase of noise and vibration are expected due to the train services in the operation stage, especially in the at-grade/viaduct sections.
Ground subsidence	C	C-	The probability of ground subsidence is undeniable and dependent on the construction method to be employed and ground conditions. Further examination would be necessary according to the construction plan and findings of ground conditions.
	P,O	D	There are no project components or activities that may cause the ground subsidence in pre-construction and operation stages.
Emanating odor	P,C,O	D	There are no project components or activities that may cause the offensive odor.
Bottom sediment	P,C,O	D	There are no project components or activities that may cause the negative impacts on bottom sediment.

Table A5-3-5b Draft Scoping Matrix on the Environmental and Social Considerations –Yellow Line–

	No.	Items of the Environment Subject to Negative/Positive Changes / Project Activities	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage									Operation Stage					
				Survey/Study on the Project	Information on the Project	Participation to the SH Meeting	Land Acquisition and Resettlement	Clearing Vegetation/Top Soil for Preparation of the Construction Works	Earth Moving: Cutting and Filling of the Construction Works	Preparation of the Construction Areas, Work Camp and Mobilization of Construction Plants and Materials	Diversion of the Existing Road	Construction Works for Stations and Entrances on the Sidewalks/Road/Privately Owned Land	Emanation of Dust, Noise and Vibration	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works	Improvement of Traffic Congestions	Improvement of Railway/Bus Stations and Other Facilities	Improvement of Road/Railway Safety	Improvement of Employment Opportunities	Improvement of Passenger-oriented Business	Improvement of Freight-oriented Business
Social Environment	1	Effects on the Livelihood of the Local Communities																			
		a. General	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	C+	C+	B+	B+	B+	C+	C+	C+
		b. Socially and Physically Disadvantaged	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		c. Women and Children	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		d. Ethnic Minority	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	2	Social Cohesion and Physical Continuity of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	3	Local Road Transportation System	C+	D	D	D	D	D	D	D	B-	D	D	D	D	B+	C+	C+	D	D	D
	4	Distribution of the Benefit of the Project	B+	D	D	D	D	D	D	D	D	D	D	D	D	A+	B+	B+	B+	C+	D
	5	Effect on the Social and Cultural Events and Tradition	C+	D	D	D	D	D	D	D	C-	D	C-	C+	C+	B+	D	D	D	D	D
	6	Effect on the Local Economic Activities																			
		a. Industrial Areas	C+	D	D	D	D	D	D	D	C-	C-	D	D	D	C+	D	D	C+	C+	D
		b. Commercial and Busines Areas	C+	D	D	D	C-	D	C-	D	C-	C-	C-	C+	C+	B+	C+	C+	B+	B+	C+
	7	Effect on the Water Rights/Commons for Grazing etc.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	8	Public Hygiene and Health Care of the Local Communities	C-	D	D	D	D	D	D	C-	D	D	B-	D	D	D	D	D	D	D	D
	9	Vulnerability/Resilience of the Society to Natural Disaster	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	10	Traffic Safety	B+	D	D	D	D	D	C-	D	C-	C-	D	D	D	B+	B+	B+	D	D	D
	11	Changes on the Land Use and the Landscape	C+/-	D	D	D	C-	D	C-	C-	C-	D	D	D	D	D	D	C+/-	D	D	D
Natural Environment	12	Geographical Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	13	Geological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	14	Soil Erosion	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	15	Faunal Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	16	Flora Ecology	B-	D	D	D	D	B-	D	C-	D	D	D	D	D	D	D	D	D	D	D
	17	Effects on the Ground Water	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	18	Effect on the Surface Water Body (River, Lakes, etc)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	19	Effect on the Coastal Environment	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	20	Oceanographic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	21	Effect on the Natural/Ecological Reserves and Sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	22	Localised Climatic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	23	Effect on the Global Warming Issues	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
Pollution	24	Air Pollution	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
	25	Water Pollution	B-	D	D	D	D	D	B-	B-	D	D	D	D	D	D	D	D	D	D	D
	26	Soil Pollution	C-	D	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D
	27	Solid Waste and/or Industrial Discharge Management	B-	D	D	D	D	B-	B-	B-	D	B-	D	D	D	D	D	D	D	D	D
	28	Noise and Vibration	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+/-	D	D	D	D	D
	29	Large Scale Ground Settlement	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	30	Emanating Odour	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	31	Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Legend: A+/-: Significant positive/negative impact is expected.
B+/-: Relatively positive/negative impact is expected.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D : No or Negligible impact is expected.

(6) Blue Line

1) Pre-construction Stage

No impact is expected in pre-construction stage.

2) During the Construction Period

Some negative impacts of air pollution, noise and vibration are expected due to operation of heavy construction equipment/vehicles as well as traffic jams that occur at construction sites. Traffic congestions should become particularly heavy in downtown area of Karachi city. These impacts will however be temporary during the construction stage only. There is no significant natural environment that will receive impacts since proposed corridors are located in the heavily built-up urban areas. Although negative impacts are not expected on the natural flora, fauna and biodiversity necessary to protect, there is a possibility of clearing trees planted on the roadside/center of the road in the area of the stations and elevated sections of Brown Line, especially in Gulshan and Gulberg areas. Where underground sections are constructed, possibilities of negative impacts on the groundwater or ground subsidence are undeniable. It is however depends much on the construction method as well as on the ground conditions. There are no project components or activities, which cause the soil contamination. However, in the case of construction site is already contaminated by other reasons, the construction workers should face negative impacts. Where the corridor is crossing over Lyari River, there is a possibility of water pollution by the turbid water generated by bridge construction activities. However the expected impacts will be temporary during construction stage.

3) Operation and Maintenance Stage

It is expected that emission of air pollutions and noise level will be reduced due to the modal shift of transportation from passenger cars to the new transportation. On the other hand, some impacts of noise and vibration are expected occur due to the train services in the operation stage, especially in the at-grade/viaduct sections in the residential areas.

Table A5-3-6a Draft Scoping on the Environmental and Social Considerations Blue Line

Item	Project Stage	Evaluation	Description
Social Environment			
Involuntary Resettlement	P	C-	Stakeholder meetings are scheduled to hold in order to disseminate information this route. It should agitate anxiety of the local residents if they would become subject to resettlement as a result of project implementation.
	C	B-	Where underground sections are constructed, entrances/exits should be constructed. In the case elevated stations are constructed, stairways to the station are constructed. As a result portions of residential/ commercial areas might become subject to land acquisition. These land owners/tenants of such land area would therefore get involved in the resettlement scheme.
	O	D	There is no resettlement involved in the operation stage of the project.
Disruption or Improvement of Livelihood	P	D	No significant impact is expected.
	C	B-	Due to noise and vibration caused by the construction activities, livelihood of the general public along the construction area, especially in the heavily congested downtown area should be negatively affected.
	O	C+/-	There are periodical noise and vibration during the operation stage of the passenger trains. On the other hand, convenience of passenger

Item	Project Stage	Evaluation	Description
			trains should improve commercial activities or commuting to work of the local population along the corridors.
Changes in the Employment and Local Economic Conditions	P	D	No impact is expected in pre-construction stage.
	C	C+	Some positive effect on the local economy is expected because of the possible increment of business/employment opportunities generated by construction activities of the project.
	O	B+	Limited but positive effect on the local economy is expected because of possible increment of business/employment opportunities generated by the operation of passenger trains.
Changes on the Land Use Patterns	P	D	No impact is expected in pre-construction stage.
	C	B-	Extent of changing the land use during the construction stage is expected to be negligible. However, in the congested areas, diversion of traffic is necessary i.e. a change of the land use patterns of limited urban areas should take place to a limited extent.
	O	C+/-	As a result of the construction of this corridor, limited area of urban land use patterns should be changed to a limited extent. There is no project components or activities, which should cause changes of land use patterns during the operation stage.
Physical Division of the Local Communities	P	D	No impact is expected during the pre-construction stage.
	C,O	D	Since the alignment of corridor is made along the existing trunk roads, no significant part of the local community would be divided by the Project.
Existing Social Infrastructure and Services	P	D	No impact is expected in pre-construction stage.
	C	B-	There are large negative impacts on the traffic, as road diversion should be made where construction works take place i.e. road traffic as vital infrastructure for the general public is disrupted to some extent. Thus significant economic activities are negatively disrupted. Impacts of such disruption are however limited to the construction period only.
	O	B+	Improvement of the urban infrastructure through the project should be made to a large extent upon completion of the Project.
Indigenous and Ethnic Minorities	P,C,O	D	There are no indigenous and ethnic minorities affected by the Project.
Distribution of Benefits	P,C	C-	The feeling of inequality among the stakeholders might cause anxiety since those in the vicinity of stations would receive benefit from the Project than others.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Local Conflict on the Interests of the Project	P,C	B-	The feeling of inequality among the local residents might cause anxiety since those away from the stations would try to bring stations in their communities.
	O	B+/-	Practically inequality among the stakeholders should take place since those in the vicinity of stations would receive benefit from the Project and the others away from the station areas would bear negative feeling on the Project.
Disruption of Water Right or Common Land	P,C,O	D	No impact on water use or water right is expected due to the project implementation.
Public Sanitation	P	D	No impact is expected in pre-construction stage.
	C	B-	Some negative impacts on the local sanitary conditions are expected due to the mobilization of workforce. Expected impacts will be temporary during the construction stage only.
	O	D	There will be no disruption of public sanitation as a result of the

Item	Project Stage	Evaluation	Description
			operation of the passenger trains.
Risks on the Hazardous and Infectious Diseases	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks are probably expected on infectious diseases among the construction workforce as well as the general public along the corridors during the construction period because of dust emanated from the construction areas. It is limited to the constriction period only.
	O	D	Operation of the Project should not be the cause of the risks on the infectious diseases.
Accidents	P	D	No impact is expected in pre-construction stage.
	C	B-	Increment of risks of accidents is expected due to the operation of heavy equipment and heavy vehicles during the construction stage.
	O	B-	Increment of risks of accidents is expected due to the train services in the operation stage.
Cultural Heritage	P,C	B-	There are a number of cultural assets likely affected in downtown area of Corridor 1 and 2 during the construction stage. Although small portions, some of the buildings constructed during the colonial period may need to reconstruct where stations are constructed.
	O	D	There are no project components or activities that may cause the negative impacts on cultural heritage in operation stage.
Natural Environment and Pollution			
Geographical and geological conditions	P,C,O	D	It is not expected that the Project will bring about the significant change or impacts on geographical and geological conditions, since the most of the Project alignment is designed on/under the existing road.
Soil erosion	P,C,O	D	It is not expected that the Project will cause the soil erosion, since the most of the Project alignment is designed on/under the existing road
Ground Water	C	C-	Some impacts on groundwater quality would be caused by the turbid water generated by cut-and-cover works for station construction.
	P, O	D	It is not expected that the Project will cause the serious impacts on groundwater artery/ quality in pre-construction and operation stages.
Surface Water	P,C,O	D	There is no impact expected to occur on the surface water.
Coastal zone	P,C,O	D	There are no coastal zones in and around the Project area.
Oceanographic changes	P,C,O	D	There is no impact on the oceanographic environment as a result of implementation of the Project.
Flora	C	B-	There is no impact on the natural flora.
	P, O	D	Trees planted on the green belt of road side are subject to felling during the construction period. Replanting of trees would be carried out while growth of trees in Karachi is limited.
Fauna	P,C,O	D	There is no impact on fauna.
Natural/Ecological reserves and sanctuary	P,C,O	D	Negative impacts are not expected, since the Project alignment is designed in developed urban area and out of natural/ecological reserves and sanctuary.
Meteorology	P,C,O	D	It is not expected that the Project will cause the significant change on the regional meteorological condition.
Global warming	P	D	No impact is expected in pre-construction stage.
	C	B-	The possibility of increased Greenhouse Gas (GHG) emission is expected due to the operation of heavy vehicles as well as traffic jam incidental to the construction works, although the expected probability will be temporary during the construction stage.
	O	B+	It is expected that the GHG emission would be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Air pollution	P	D	No impact is expected in pre-construction stage.

Item	Project Stage	Evaluation	Description
	C	B-	Some negative impacts on air quality are expected due to operation of heavy equipment/ vehicles as well as traffic jam incidental to construction works, although the expected impacts will be temporary during the construction stage
	O	B+	It is expected that emission of air pollutants will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system.
Water pollution	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts on water quality would be caused by the turbid water generated from construction yards of cut-and-cover works or bridge construction activities as well as by the effluent generated from workers' camp sites, although the expected impacts will be temporary during construction stage.
	O	D	The facilities associated to the new transportation system will be operated according to the Pakistan regulations and guidelines related to managing the wastewater or effluent. Therefore, it is not expected to bring about the serious impacts on water quality in operation stage.
Soil contamination	C	C-	There are no project components or activities which cause the soil contamination. However, in case that the soil at the construction sites is already contaminated by other reasons, the construction activity of the Project may cause the negative impacts.
	P,O	D	There are no project components or activities which cause the soil contamination in pre-construction and operation stages.
Waste	P	D	No impact is expected in pre-construction stage.
	C	B-	It is expected that the Project will generate the construction waste in the construction stage.
	O	D	The waste generated from the facilities associated to the new transportation system will be managed according to the Pakistan regulations and guidelines concerned, then it is not expected to cause the serious impacts.
Noise and vibration	P	D	No impact is expected in pre-construction stage.
	C	B-	Some impacts of noise and vibration are expected due to the operation of the heavy equipment/ vehicles, although the expected impacts will be temporary during the construction stage.
	O	B+/-	It is expected that emission of noise and vibration will be reduced due to the modal shifting of transportation from passenger cars/ buses to the new transportation system. On the other hand, some impacts of noise and vibration are expected due to the train services in the operation stage, especially in the at-grade/ viaduct sections.
Ground subsidence	C	C-	The probability of ground subsidence is undeniable and dependent on the construction method to be employed and ground conditions. Further examination would be necessary according to the construction plan and findings of ground conditions.
	P,O	D	There are no project components or activities that may cause the ground subsidence in pre-construction and operation stages.
Emanating odor	P,C,O	D	There are no project components or activities that may cause the offensive odor.
Bottom sediment	P,C,O	D	There are no project components or activities that may cause the negative impacts on bottom sediment.

Table A5-3-6b Draft Scoping Matrix on the Environmental and Social Considerations –Blue Line–

	No.	Items of the Environment Subject to Negative/Positive Changes / Project Activities	Overall Evaluation on the Project	Pre-construction Stage			Construction Stage									Operation Stage					
				Survey/Study on the Project	Information on the Project	Participation to the SH Meeting	Land Acquisition and Resettlement	Clearing Vegetation/Top Soil for Preparation of the Construction Works	Earth Moving: Cutting and Filling of the Construction Works	Preparation of the Construction Areas, Work Camp and Mobilization of Construction Plants and Materials	Diversion of the Existing Road	Construction Works for Stations and Entrances on the Sidewalks/Road/Privately Owned Land	Emanation of Dust, Noise and Vibration	Localized Employment Opportunities of the Construction Works	Localized Business Opportunities Related to the Construction Works	Improvement of Traffic Congestions	Improvement of Railway/Bus Stations and Other Facilities	Improvement of Road/Railway Safety	Improvement of Employment Opportunities	Improvement of Passenger-oriented Business	Improvement of Freight-oriented Business
Social Environment	1	Effects on the Livelihood of the Local Communities																			
		a. General	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	C+	C+	B+	B+	B+	C+	C+	C+
		b. Socially and Physically Disadvantaged	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		c. Women and Children	C-	C-	C-	C-	C-	D	D	D	C-	C-	C-	D	D	B+	B+	B+	D	D	D
		d. Ethnic Minority	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	2	Social Cohesion and Physical Continuity of the Local Communities	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	3	Local Road Transportation System	C+	D	D	D	D	D	D	D	B-	D	D	D	D	B+	C+	C+	D	D	D
	4	Distribution of the Benefit of the Project	B+	D	D	D	D	D	D	D	D	D	D	D	D	A+	B+	B+	B+	C+	D
	5	Effect on the Social and Cultural Events and Tradition	C+	D	D	D	D	D	D	D	C-	D	C-	C+	C+	B+	D	D	D	D	D
	6	Effect on the Local Economic Activities																			
		a. Industrial Areas	C+	D	D	D	D	D	D	D	C-	C-	D	D	D	C+	D	D	C+	C+	D
		b. Commercial and Busines Areas	C+	D	D	D	C-	D	C-	D	C-	C-	C-	C+	C+	B+	C+	C+	B+	B+	C+
	7	Effect on the Water Rights/Commons for Grazing etc.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	8	Public Hygiene and Health Care of the Local Communities	C-	D	D	D	D	D	D	C-	D	D	B-	D	D	D	D	D	D	D	D
	9	Vulnerability/Resilience of the Society to Natural Disaster	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	10	Traffic Safety	B+	D	D	D	D	D	C-	D	C-	C-	D	D	D	B+	B+	B+	D	D	D
	11	Changes on the Land Use and the Landscape	C+/-	D	D	D	C-	D	C-	C-	C-	D	D	D	D	D	D	C+/-	D	D	D
Natural Environment	12	Geographical Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	13	Geological Conditions	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	14	Soil Erosion	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	15	Faunal Ecology	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	16	Flora Ecology	B-	D	D	D	D	B-	D	C-	D	D	D	D	D	D	D	D	D	D	D
	17	Effects on the Ground Water	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	18	Effect on the Surface Water Body (River, Lakes, etc)	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	19	Effect on the Coastal Environment	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	20	Oceanographic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	21	Effect on the Natural/Ecological Reserves and Sanctuaries	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	22	Localised Climatic Changes	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	23	Effect on the Global Warming Issues	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
Pollution	24	Air Pollution	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+	D	D	D	D	D
	25	Water Pollution	B-	D	D	D	D	D	B-	B-	D	D	D	D	D	D	D	D	D	D	D
	26	Soil Pollution	C-	D	D	D	D	D	C-	D	D	D	D	D	D	D	D	D	D	D	D
	27	Solid Waste and/or Industrial Discharge Management	B-	D	D	D	D	B-	B-	B-	D	B-	D	D	D	D	D	D	D	D	D
	28	Noise and Vibration	B+/-	D	D	D	D	D	B-	D	D	B-	D	D	D	B+/-	D	D	D	D	D
	29	Large Scale Ground Settlement	C-	D	D	D	D	D	C-	D	D	C-	D	D	D	D	D	D	D	D	D
	30	Emanating Odour	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	31	Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Legend: A+/-: Significant positive/negative impact is expected.
B+/-: Relatively positive/negative impact is expected.
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)
D : No or Negligible impact is expected.

3.2.3 Social Environment

(1) Green Line

i) Pre-construction Stage

GREEN LINE is generally following the existing road alignment from north to southwest linking the residential area in the north of Karachi to the city centre. There will be a limited number of households would be directly affected. In places where stations are constructed, their entrances of either superstructure or substructure might be in need of land acquition including a portion or entire building subject to demolition. Details are subject to further study on designing of stations.

ii) During the Construction Period

During the construction period, highly congested area toward the centre of the city, road diversion should be carried out in order to provide space for construction works. Thus severe traffic congestion, coupled with construction materials, debris, dust and noise emanated from the construction area, will cause annoyance to the general public.

iii) Operation and Maintenance Stage

Upon completion of the construction works, where superstructure is constructed, shade will be casted over west to east side of streets. Thus the building alongside the corridor should be in most of the time of year in the shade as the alignment is general from east to west.

(2) Brown Line

i) Pre-construction Stage

BROWN LINE is generally following the existing road alignment from northwest to southeast on the eastern fringe of Karachi city. There will be a limited number of households directly affected. In places where stations are constructed, their entrances of either superstructure or substructure might be in need of land acquisition including a portion or entire building subject to demolition. Details are subject to further study on designing of stations.

ii) During the Construction Period

During the construction period, highly congested area toward the centre of the city, road diversion should be carried out in order to provide space for construction works. Thus severe traffic congestion, coupled with construction materials, debris, dust and noise emanated from the construction area, will cause annoyance to the general public.

iii) Operation and Maintenance Stage

Upon completion of the construction works, depending on the locations, shade will be cased over west to east of the street following the movement of sun. These will probably be the advantage for the local people for which relatively cool living environment is created.

(3) Red Line

i) Pre-construction Stage

RED LINE is generally following the existing road alignment from east to west of southwest linking the eastern residential area to the centre of Karachi city. There will be a limited number of households directly affected in the area near downtown area. In places where stations are constructed, their entrances of either superstructure or substructure might be in need of land acquisition including a portion or entire building subject to demolition. Details are subject to further study on designing of stations.

ii) During the Construction Period

During the construction period, highly congested area toward the centre of the city, road diversion should be carried out in order to provide space for construction works. Thus severe traffic congestion, coupled with construction materials, debris, dust and noise emanated from the construction area, will cause annoyance to the general public.

iii) Operation and Maintenance Stage

Upon completion of the construction works, depending on the locations, shade will be cased over north side of the street following the movement of sun. These will probably be the advantage for the local people for which relatively cool living environment is created.

(4) Yellow Line

i) Pre-construction Stage

YELLOW LINE is generally following the existing wide road running from east to northwest within the Korangi Industrial Area to the center of Karachi city. There will be a very few number of households directly affected in the area on the west side of Malir River. Details are subject to further study on designing of stations.

ii) During the Construction Period

During the construction period, although road diversion should be carried out in order to provide space for construction works, traffic congestion may not so severe because of relatively wide road. However, debris, dust and noise emanated from the construction area will cause annoyance to the general public.

iii) Operation and Maintenance Stage

Upon completion of the construction works, depending on the locations, shade of the elevated railway structure will be cased over north side of the street following the movement of sun. These will probably be the advantage for the local people as relatively cool living environment is created. On the other hand, permanent shading might cause interruption to the growth of plants along the street.

(5) Blue Line

i) Pre-construction Stage

BLUE LINE is generally following the existing road alignment from northeast to southwest passing through the core of Karachi city. In the area near downtown relatively a number of households/shops would become directly affected. In places where stations are constructed, their entrances of either superstructure or substructure might be in need of land acquisition and a portion or entire building might become in need of demolition. Details are subject to further study on designing of stations.

ii) During the Construction Period

During the construction period, highly congested area toward the centre of the city, road diversion should be carried out in order to provide space for construction works. Thus severe traffic congestion, coupled with deposition of construction materials, debris, dust and noise emanated from the construction area, will cause annoyance to the general public.

iii) Operation and Maintenance Stage

Upon completion of the construction works, where superstructure is made, shade will be casted over northwest to southeast side of streets. Thus the building alongside the corridor should be in the shade following the movement of the sun i.e. present living environment may be created. On the other hand growth of plants along side the street may be interrupted to some extent.

4. Method of Evaluation for the Environmental Impacts on the Suggested Corridors

4.1 Natural Environment

4.1.1 Current Environmental Conditions

Referring to the above individual matrixes, **Air quality**, **Noise and Vibration** and **Tree clearing** are selected as the index in order to compare the corridors on the point of natural environmental aspect. As for these three parameters, positive/negative changes or impacts are examined in all proposed corridors.

The current air pollution and noise will be improved by mass transportation system during the operation phase. Tree clearing will be made during the construction stage. Although there are some possibilities of positive/negative impacts for other environmental parameters during construction/operation phase, it is difficult to compare the influence of the construction impacts by other items at this study stage because construction method and location have not been determined.

As for the impact for underground environment in the case of underground construction works, extent of positive or negative impact is unknown. A further examination, which is based on more detail project description, is needed. The impact will be clarified as the study progress in the next stage.

4.1.2 Assessment on the Current Environmental Conditions within the Study Area

(1) Air Quality

Air pollution has emerged as a major ecological problem. Automobile exhaust, industrial emissions, open burning of garbage, domestic and commercial fuel source are increasing. Table A5-4-1 shows the air quality of 31 locations. The survey was conducted by the past studies of mass transit development projects.

In “Feasibility Study & Development of Transportation Control Plan (TCP) of Karachi Metropolis (2007)” during the year 2005 – 2006, the sampling and measurement was conducted at 26 locations. These locations were on the major roads in Karachi.

In Special Assistance for project formation for Karachi Circular Railway (KCR) Project (2009 JICA) during the year 2008, the measurement was conducted at 5 locations. These locations were near the proposed KCR stations.

Values of the concentration of NOx and CO of the above studies are higher than National Environmental Quality Standards (NEQS) limits while SO2 concentration is much lower at all monitored locations for TCP project. PM10 concentration is also higher than NEQS except in two locations.

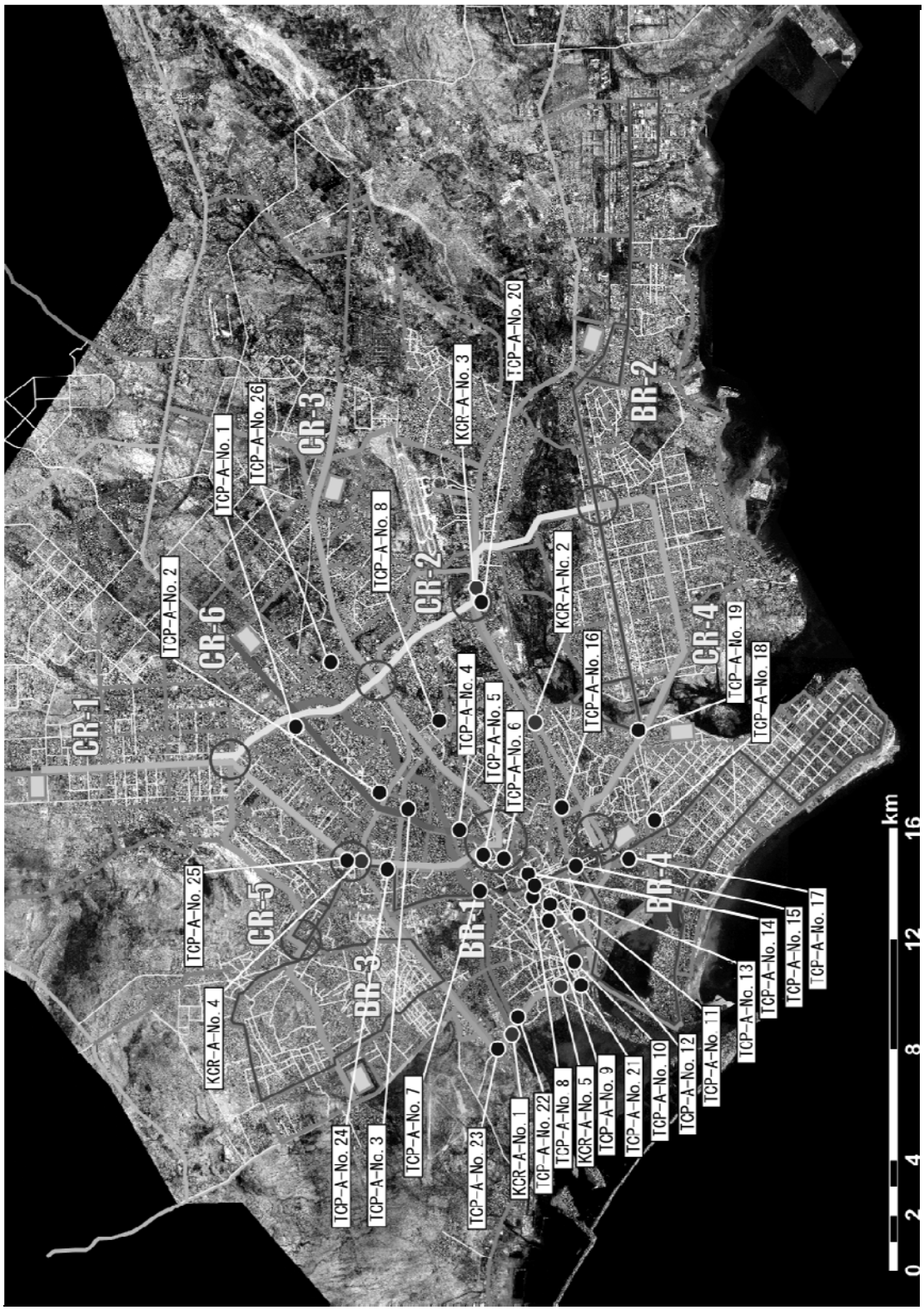
Equally, CO and PM 10 concentrations of KCR project are higher than NEQS limits but at only two locations. This result shows that the road traffic has produced relatively high pollution levels along city roads in general.

Table A5-4-1 Air Quality at Monitored Locations

S/N	Project No.	Location	SO_2(ppb)				NOx(ppb)				CO(μg/m^3)				PM_{10}(μg/m^3)			
			Ave	Max	Min	NEQS	Ave	Max	Min	NEQS	Ave	Max	Min	NEQS	Ave	Max	Min	NEQS
No. 1	TCP-1	Sohrab Goth	22	39	18	46	111	237	28	75	7	13	3	4	309	460	81	200
No. 2	TCP-2	Karimabad	22	39	12	(80 μ g/m^3)	84	195	20	(80 μ g/m^3)	5	13	2	(5mg/m^3)	289	435	78	Annual
No. 3	TCP-3	Liaquatabad # 10	14	28	18	Annual	127	215	32	Annual	7	13	3	8hours	287	428	148	Average
No. 4	TCP-4	Tin Hatti	28	20	6	Average	120	214	15	Average	7	14	2	Average	212	352	40	
No. 5	TCP-5	Gru Mandir	20	42	21		115	241	32		5	11	2		287	429	148	
No. 6	TCP-6	Old Numaish	20	31	10		119	196	35		7	12	2		159	315	46	
No. 7	TCP-7	Garden Road Interaction	20	27	12		132	235	32		8	14	4		221	470	67	
No. 8	TCP-8	Tibbet Center	20	26	15		119	196	30		8	14	2		309	469	98	
No. 9	TCP-9	Maulvi Musafir Khana	20	32	12		79	196	37		6	13	1		248	480	150	
No. 10	TCP-10	Merewether Tower	26	39	13		139	230	30		9	15	2		288	428	148	
No. 11	TCP-11	Ziauddin & Chundrigar Road Intersection	25	34	15		120	240	23		7	11	3		228	415	94	
No. 12	TCP-12	Burns Road	27	40	13		127	239	21		7	16	2		222	405	53	
No. 13	TCP-13	Garden Road and Preedy Street Intersection	23	40	11		99	226	23		6	16	2		268	453	95	
No. 14	TCP-14	Empress Market	22	36	15		79	232	20		9	15	2		239	426	74	
No. 15	TCP-15	Metropole Hotel	22	34	14		119	233	35		6	10	3		210	326	45	
No. 16	TCP-16	F&T Center	24	38	13		154	240	32		9	16	2		287	465	105	
No. 17	TCP-17	Teen Talwar	21	30	13		123	214	28		8	14	1		223	475	132	
No. 18	TCP-18	Sunset Boulevard and Gizri Road Intersection	20	27	12		131	235	32		8	14	4		228	415	93	
No. 19	TCP-19	Korangi Road & Baloch Colony Bypass	22	36	15		79	232	20		10	15	2		248	480	149	
No. 20	TCP-20	Dirgh Road Station	24	36	16		93	222	20		8	14	2		229	469	90	
No. 21	TCP-21	Karachi Port Trust (KPT)	25	34	16		139	260	20		9	13	4		184	441	97	
No. 22	TCP-22	Mauripur Road	25	32	18		96	230	28		7	12	3		233	451	64	
No. 23	TCP-23	Gul Bai Intersection	23	34	14		98	247	20		7	13	4		309	460	81	
No. 24	TCP-24	Nazimabad	24	35	18		88	237	27		6	12	3		210	490	135	
No. 25	TCP-25	North Nazimabad	25	40	18		90	231	20		7	16	2		234	375	49	
No. 26	TCP-26	Gushan Chorangi	24	39	13		120	190	30		8	13	3		289	436	78	
No. 27	KCR-1	Baldia near Gulbai	24	34	12		35	45	21		4	5	3		181	241	123	
No. 28	KCR-2	Chaniser Halt	19	31	6		36	48	18		3	4	1		170	230	130	
No. 29	KCR-3	Depot Hill near Drigh Road	26	39	12		38	52	19		6	7	5		167	240	126	
No. 30	KCR-4	North Nazimabad	19	34	7		34	47	14		3	4	2		163	236	126	
No. 31	KCR-5	Waizir Mansion	12	28	19.6		15	40	27		1	6	3		221	287	155	

Source: Feasibility Study & Development of Transportation Control Plan of Karachi Metropolis (2007) , Special Assistance for project formation for Karachi Circular Railway Project (2009 JICA), Illustration by the JICA Study Team

Note: Gray highlight means the over concentration of National Environmental Quality Standards (NEQS).



Source: Feasibility Study & Development of Transportation Control Plan of Karachi Metropolis (2007) , Special Assistance for project formation for Karachi Circular Railway Project (2009 JICA), Illustration by the JICA Study Team

Figure A5-4-1 Monitored Corridors of Air Quality

(2) Noise

Noise pollution from vehicles is also serious problem in Karachi city, especially in residential areas. Major contributors to the noise pollution are the use of vehicle horns, removal of silencers on exhaust pipe of rickshaws, high volume of traffic especially heavy vehicle and poorly maintained vehicles. Table A5-4-2 shows the Noise level of 37 locations, which were conducted by the previous studies as mentioned by the above section. In TCP project, the sampling and measurement was conducted at 26 locations. In KCR project, the measurement was conducted at 11 locations.

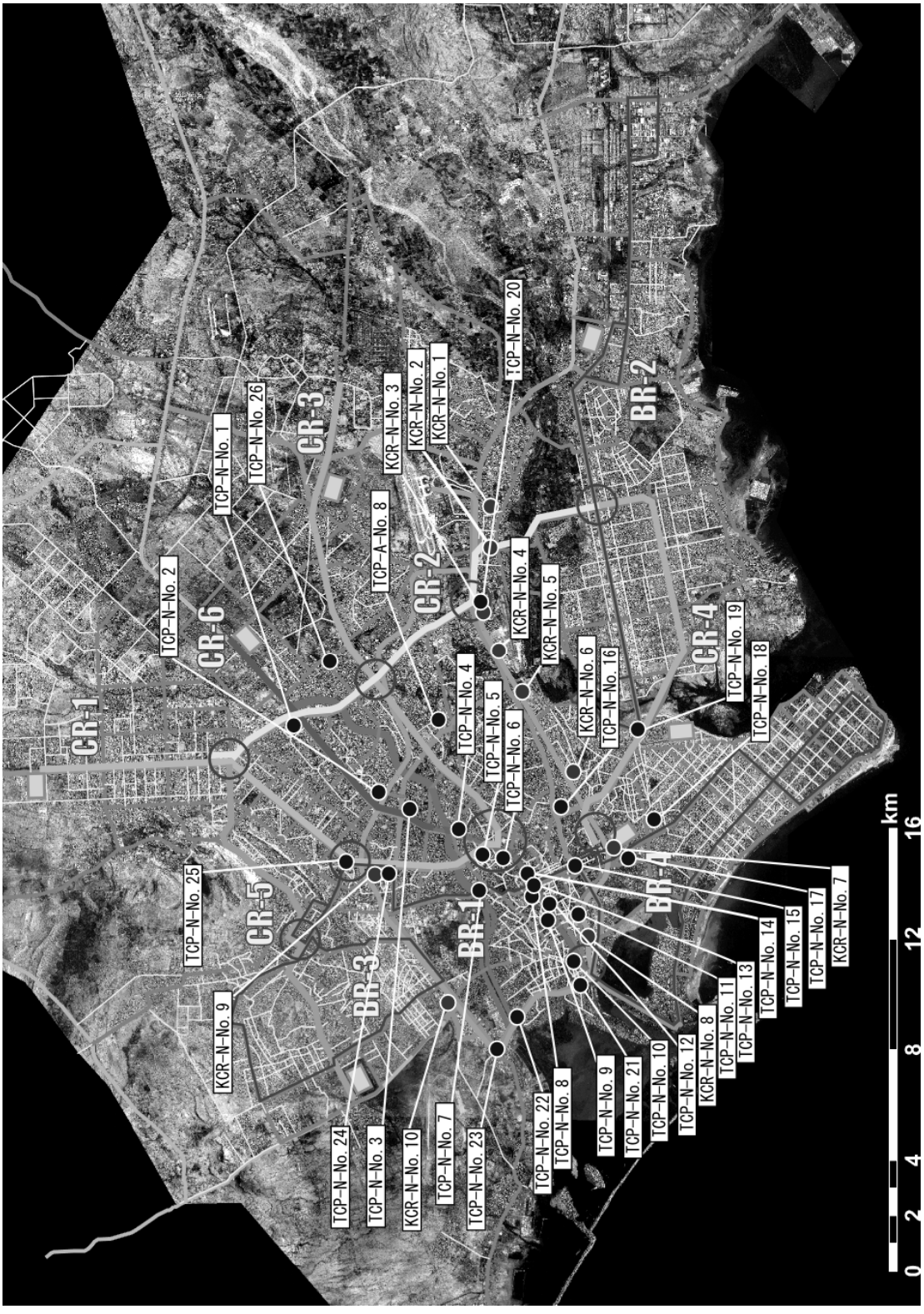
Noise levels of almost of all locations for TCP project are exceeding NEQS. It recommends for noise level in the living environment and industrial area at around 75 dB during daytime. The noise level data suggest that the vehicular traffic is the main source of noise pollution.

Table A5-4-2 Noise Level at Monitored Location

S/N	Project No.	Location	dB(A) Ave	Max	Min	NEQS	S/N	Project No.	Location	dB(A) Ave	Max	Min	NEQS
No. 1	TCP-1	Sohrab Goth	79	85	69	75	No. 20	TCP-20	Dirgh Road Station	79	90	65	75
No. 2	TCP-2	Karimabad	82	94	67		No. 21	TCP-21	Karachi Port Trust (KPT)	74	86	64	
No. 3	TCP-3	Liaquatabad # 10	76	81	71		No. 22	TCP-22	Mauripur Road	76	96	58	
No. 4	TCP-4	Tin Hatti	76	83	69		No. 23	TCP-23	Gul Bai Intersection	79	85	69	
No. 5	TCP-5	Gru Mandir	76	81	71		No. 24	TCP-24	Nazimabad	77	89	64	
No. 6	TCP-6	Old Numaish	75	80	70		No. 25	TCP-25	North Nazimabad	76	88	64	
No. 7	TCP-7	Garden Road Interaction	78	82	73		No. 26	TCP-26	Gushan Chorangi	82	94	67	
No. 8	TCP-8	Tibbet Center	81	86	75		No. 27	KCR-1	Star Gate Halt Station	43	54	30	75
No. 9	TCP-9	Maulvi Musafir Khana	80	99	68		No. 28	KCR-2	Drigh Colony Station	54	81	30	
No. 10	TCP-10	Merewether Tower	76	81	70		No. 29	KCR-3	Drigh Road Station	59	80	35	
No. 11	TCP-11	Ziauddin & Chundrigar Road Intersection	78	85	70		No. 30	KCR-4	Air Force Halt Station	47	68	44	
No. 12	TCP-12	Burns Road	80	90	68		No. 31	KCR-5	Karsaz Station	31	32	31	
No. 13	TCP-13	Garden Road and Preedy Street Intersection	77	88	71		No. 32	KCR-6	Chanesar Station	51	58	42	
No. 14	TCP-14	Empress Market	79	85	74		No. 33	KCR-7	Karachi Cantt Station	74	81	63	
No. 15	TCP-15	Metropole Hotel	80	91	69		No. 34	KCR-8	Karachi City Station	42	76	31	
No. 16	TCP-16	F&T Center	78	89	68		No. 35	KCR-9	Near Abbasi Shaheed Hospital	72	85	70	
No. 17	TCP-17	Teen Talwar	79	82	70		No. 36	KCR-10	Shershah	73	88	60	
No. 18	TCP-18	Sunset Boulevard and Gizri Road Intersection	78	85	70		No. 37	KCR-11	Nipa	61	–	–	
No. 19	TCP-19	Korangi Road & Baloch Colony Bypass	80	99	68								

Source: Feasibility Study & Development of Transportation Control Plan of Karachi Metropolis (2007) , Special Assistance for project formation for Karachi Circular Railway Project (2009 JICA), Illustration by the JICA Study Team

Note: Gray highlight means the over concentration of National Environmental Quality Standards (NEQS) during daytime at the industrial area



Source: Feasibility Study & Development of Transportation Control Plan of Karachi Metropolis (2007) , Special Assistance for project formation for Karachi Circular Railway Project (2009 JICA), Illustration by the JICA Study Team

Figure A5-4-2 Monitored Corridors of Noise Level

(3) Vibration

In Pakistan, there is no current situation data of vibration. There is no regulation about vibration.

(4) Water quality

Road network in Karachi cross over two main rivers, Lyari and Malir, and a few drainage channels. Waters in the rivers and channels are polluted mainly by wastewater discharged from factories and local houses. Table A5-4-3 shows the surface water quality of 5 locations, which were conducted by KCR studies. Most of water quality items such as BOD, COD, TSS, TDS and oil & grease are high. There is no environmental standard regarding water quality while there is National Standards for Drinking Water Quality (2010) and National Surface Water Classification Criteria (2007, WWF).

Table A5-4-3 Water quality at Monitored Location

No.	Parameter	Unit	No. 1 KCR-1 Near Site Avenue	No. 2 KCR-2 Near Wazir Mension	No. 3 KCR-3 Orangi Nala near HinoPak Motors	No. 4 KCR-4 Gujjar Nala near Musa Colony	No. 5 KCR-5 Lyari River near Ghariabad	Japanese Environmental Quality Standard
1	PH	-	7.8	8.5	9	8.5	9.5	6.0-8.5(only for river water)
2	Alkalinity	mg/l	80	88	98	85	108	
3	BOD	mg/l	173	230	29.5	240	250	less than or equal to 10 (only for river water)
4	COD	mg/l	208	200	230	210	230	less than or equal to 8 (only for Sea Water)
5	TSS	mg/l	410	474	535	425	630	less than or equal to 100 (only for river water)
6	Turbidity	NTU	>5	>5	>5	>5	>5	
7	TDS	mg/l	908	1128	1278	1462	1462	
8	Oil &Grease	mg/l	0.98	1	0.76	1.2	1.2	0(only for Sea Water)

Source: Special Assistance for project formation for Karachi Circular Railway Project (2009 JICA), Illustration by the JICA Study Team

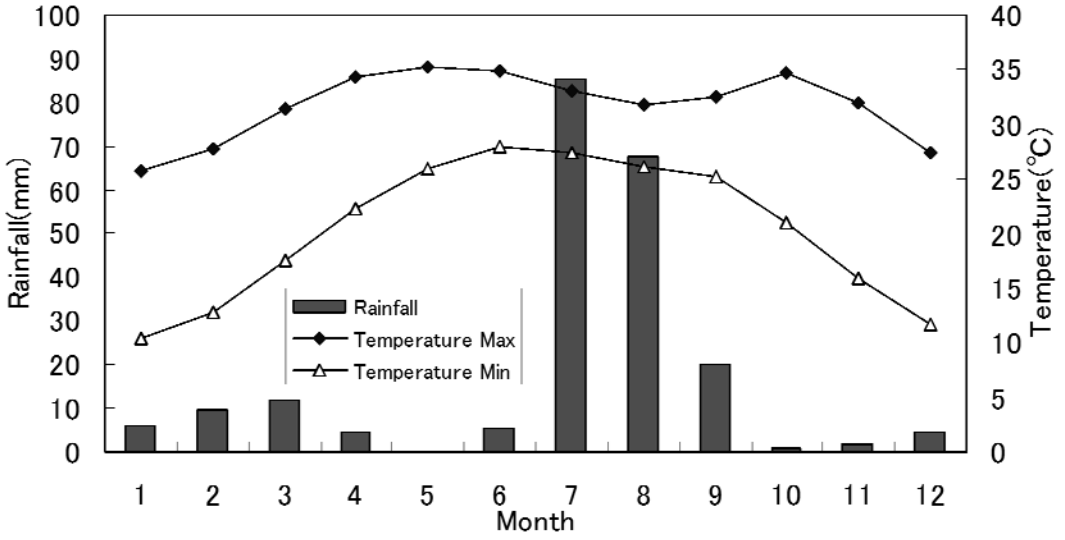
Note: There is no environmental standards regarding water quality in Pakistan.

Source: Special Assistance for project formation for Karachi Circular Railway Project (2009 JICA), Illustration by the JICA Study Team

Figure A5-4-3 Monitored Corridors of Water quality

(5) Climate

The air temperatures in Karachi are generally high throughout the year. Highest temperatures occur in May and October. Rainfall in Karachi is extremely low. Heaviest rainfall occurs in July and August during monsoon. The annual rainfall in this area is less than 250millimeters. The temperature and rainfall records at Karachi Airport are shown in Figure A5-4-4.



Source: Pakistan Meteorological Department, , Illustration by the JICA Study Team

Figure A5-4-4 Temperature and Rainfall 2009 in Karachi Airport

(6) Protected Areas, Ecosystem and Plant Ecology

Karachi city is largest industrial center in Pakistan and has already been developed region. As for plant in the city, trees are planted in the park, roadside and green belt.

There are mangrove areas and wet lands outsides of the project area that are protected as natural resources. Mangrove is on the coast in the south side of Karachi. Wetland is located near Hub Dam, which is in the northeast of Karachi and far from project area. There is no area necessary to protect or being protected as valuable area of ecosystem or conservation area directly affected by the project implementation.

(7) Others

Vehicle traffic has increased significantly in recent years, far exceeding the carrying capacity of the Karachi's road. Heavy traffic jam causes ever-worsening air pollution, and serious public health concerns such as asthma and respiratory ailments. Traffic safety and negative impacts on urban ecology such as early senescence and dwarfing of trees are also of concern.

4.1.3 Methods for Initial Environmental Evaluation

(1) Methodology

Method for initial environmental evaluation is suggested as follows:

i) The environmental monitoring data near, around or along each corridor is collected in order to verify the current environmental conditions;
ii) Comparison with the NEQS;

iii) Comparison between the different monitoring locations; and
iv) Outline to examine the influence of the project implementation.

(2) Noise and Vibration

There is no viable data on noise and vibration that is possible to make use of for IEE study. Thus assumption is made as follows:

i) Heavy railway carriage operated for LRT corridor should cause more noise and vibration than BRT corridors that use lighter body of buses. This depends much on the ground conditions;
ii) Among LRT corridors, the level of noise and vibration is assumed the same; and
iii) Among BRT corridors, the level of noise and vibration is assumed the same.

Thus, BRT corridors should cause less environmental impacts in terms of noise and vibration level. However, among BRT corridors that emanate less noise and vibration than LRT corridors, selection of one particular corridor is not possible based on the level of noise and vibration.

(3) Trees Planted on the Greenbelt and Road Side

Trees planted on the green belt or on the road side along LRT corridors and BRT corridors differ from one place to the other. However, the following assumption is made:

i) Among LRT corridors, all the trees planted on the green belt have to be clearing during as elevated and underground sections are constructed;
ii) Among BRT corridors, trees on the green belt or road side are selectively cut down at the construction site for bus stop; and
iii) All of the trees are replanted upon completion of the construction works.

As above, environmental impacts in terms of the number of trees subject to fell in the case of the implementation of BRT corridors is much smaller than the case of LRT implementation. However, among BRT corridors, selection of one particular corridor is not possible based on the number of trees subject to felling unless otherwise detailed tree felling plan based on the detailed alignment of such corridor is made.

4.2 Basic Information Collection for Social Environment Analysis

4.2.1 Socio-economic Baseline Survey

1) Long list of the local consulting firms is made by CDGK on 25th November, 2010;
2) For the long-listed 32 local consulting firms, letters containing a form of the Expression of Interest for the socio-economic baseline survey have been sent out on 1st December, 2010;
3) Schedule of the selection process is as follows:
    i) Attached form should be validly filled in and returned to the address below by ordinary post or via e-mail using PDF file of your documents not later than December 8th, 2010
    ii) Based the validity of the expression of interest, short-listed consulting firms will be informed via e-mail for those indicated their e-mail address on the attached form not later than December 15th, 2010.
    iii) Invitation for bidding shall be sent out on December 18th, 2010.
    iv) Deadline for bidding shall be January 5th 2011 followed by contract negotiations.

Successful local consulting firm should commence the socio-economic baseline survey from 10th January 2011 and complete 10th April 2011.

4.2.2 Parameters of Socio-economic Baseline Survey

Parameters of the social environment study are maintained at the level of IEE study. Contents of data gathering on the socio-economic baseline survey are indicated in Table A5-4-4. Based on these data and the result of interview survey, social impact assessment is carried out in order to select a corridor for feasibility study.

Table A5-4-4 Contents of the Study on Socio-economic Baseline Survey

Items		Target Area	Data
1.Social Conditions	1-1. Settlement & Social Structures	All the township and Union Council that fall into the selected corridors	- List the towns and union councils within Karachi and its administrative structure that are affected by the Project. - Decision making process and administrative system in each level of local government structure - Administrative practice of land acquisition in Karachi, laws and regulations related to the land acquisition as well as to the cost-bearing system and arrangement of compensation and rehabilitation for the PAPs that may result of the implementation of the Project - Observation of the non-titled residents occupying right of way of the passenger transportation corridors including kachi abadis, if any such area would become a part of the right of way.
	1-2. Census data in each township and Union Council	All the township and Union Council that fall into the selected corridors	Carry out 10-100 households survey per corridor in order to obtain approximate baseline of the socio-economic conditions along each passenger transportation corridors and analyze the following parameters: - Social/economic indicators of census, including population by age and sex - Occupational structure by each sector of economy - Rates of marginal workers - Slum population including the distribution of kachi abadis, if any such area would become a part of the right of way. - Educational level - Literacy rate - Poverty level
	1-2. Census data in each township and Union Council	All the township and Union Council that fall into the selected corridors	- Disabled population - Types of religions - Ethnic minorities, indigenous peoples, tribes, etc. and other social indicators as appropriate to evaluate local community's situation in union council level.
	1-3.Land Use Patterns	All the Town and Union Council that fall into the selected	- Governmental land use plan - Land use by category within township and union council

		corridors	
	1-4.Infrastructure and Public Facilities	All the Town and Union Council and that fall into the transportation corridors	- List the locations of the following facilities at union council level: a. Industrial facilities b. Medical facilities c. Educational facilities d. Cultural and religious facilities, including shrines, sacred sanctuaries, sacred centres, archaeological sites etc.
	1-5.Cultural Heritage	All the Town and Union Council that fall into the selected corridors	- Name and geographical locations of natural and cultural heritage area - Its anecdotes
	1-6. Public Hygiene and Safety	Concerned Town and Union Council	- Morbidity of epidemic disease in each town - Morbidity of infectious diseases such as HIV/AIDS in each district - Number of accidents occurred on the railway and road (including the cases animals are involved if applicable)
2. Legal and Institutional Aspect	2-1.Procedure of EIA	Laws and regulations of the Government of Pakistan	- Organizational structure concerning EIA implementation in the Government of Pakistan - Laws and regulations concerning implementation of social impact assessment in Pakistan - Procedures of verification and approval of the report on SOSE as well as RAP

3) Stakeholder Meeting

Stakeholder meeting has to be carried out in order to disseminate information the contents of Master Plan of the Project. Venue and timing of the meeting would have to be subject to further elaboration. However, the following is considered important to bear in mind as stakeholder meeting is planned:

i) Explain the result of overall and entire corridor study by one of JICA Study Team members;
ii) Three locations are selected in order to elicit the opinions considered as average opinions of the participants on the public transportation system in Karachi;
iii) Approximately 100 participants should be invited to each meeting;
iv) The result should be taken into consideration of the overall corridor study if comments made by the participants are considered valid; and
v) The result should also be taken into consideration of which a corridor is selected for feasibility study in the light of its importance in terms of the views on public transportation system.

Results are incorporated into the social impact assessment.

4.3 Social Impact Assessment

4.3.1 Framework of Social Impact Assessment

Analyzing impact equity, who gains and who loses from the Project, is central theme to the SIA process. Normally, emphasis will be given to identifying and mitigating adverse impacts. These impacts should be specified and reported for each corridor, both LRT and BRT. In this regard,

particular attention should be given to highlighting adverse impacts on people who are sensitive or vulnerable that is by reason of age, gender, ethnicity, caste, poverty or other factors.

4.3.2 Steps of the SIA Process

In general the following SIA process is carried out:

i) Public involvement: develop and implement an effective public involvement plan to involve all interested and affected stakeholders;
ii) Identification of alternatives: describe the proposed action and reasonable alternatives to it, including the no action alternative;
iii) Profile of baseline condition: document the relevant human environment/area of influence of the Project and the existing social conditions and trends (using the characteristics and variables described previously);
iv) Scoping: identify and prioritise the range of likely social impacts through a variety of means, including discussion or interviews with numbers of all potentially affected;
v) Projection of estimated effect: analyse and predict the probable impacts of the Project and the alternatives against baseline conditions (with versus without the action);
vi) Prediction and evaluation of responses to impacts: determine the significance of the identified social impacts to those who will be affected;
vii) Estimate indirect and cumulative impacts: identify the subsequent, flow-on effects of the Project, including the second/third order impacts and their incremental impacts when added to other past, present and foreseeable current activities;
viii) Changes to alternatives: recommend new or changed alternatives and estimate or project their consequences for affected and interested stakeholders;
ix) Mitigation: develop and implement a mitigation plan, in order of preference to firstly avoid, secondly minimise and thirdly compensate for adverse impacts; and
x) Monitoring: develop and implement a monitoring programme to identify deviations from the proposed action and any important unanticipated impacts.

4.3.3 Methods for Predicting Social Impacts

Method for predicting social impacts varies from one project to the other depending on the combination of the nature of project and the existing natural and social conditions. Thus a combination of the following methods will have to be used:

i) Trend extrapolations: projecting current trends, such as population change or employment, into the future (with or without modifying the rate of change);
ii) Population multipliers: extrapolated increases in population size are coefficients for the change in other variables, such as employment and demand for housing, infrastructure or services;
iii) Consultation to experts: use of expert knowledge such as researchers, professional consultants, local authorities, or knowledgeable citizens;
iv) Scenario development: exercises to develop the likely, alternative or preferred future of a community or society. Scenarios can be used to compare different outcomes (best versus worst case); and
v) Comparative studies: examining how an affected community has responded to change in the past, or the impact on other communities that have undergone a similar action.

Based on the result of social impact assessment, information for selection of a corridor for feasibility study is provided.

5. Result of the Evaluation of Profile of the Natural Environment

The profile and situation of the mass transit corridors concerned with the environmental parameters for SEA is shown in Table A5-5-1

Table A5-5-1 Evaluation of the Profile of Environment

Items		Green Line		Brown Line		Red Line		Yellow Line		Blue Line	
Project Outline	Corridor Length	18.0km	100%	18.6km	100%	13.7km	100%	16.1km	100%	17.6km	100%
	Elavated	14.2km	79%	18.6km	100%	11.3km	82%	16.1km	100%	8.9km	50%
	Transition	0.5km	3%	0.0km	0%	0.5km	4%	0.0km	0%	0.5km	3%
	Under Ground	3.3km	18%	0.0km	0%	1.9km	14%	0.0km	0%	8.3km	47%
Situation of Project Site	a) The Length of the existing road according to the width										
	No Road	0.1km	1%	0.2km	1%	0.0km	0%	0.4km	2%	0.0km	0%
	Under 29m	0.0km	0%	2.8km	15%	0.0km	0%	2.7km	17%	3.5km	20%
	30m-	3.0km	17%	2.7km	15%	1.6km	12%	1.7km	11%	2.6km	15%
	40m-	0.0km	0%	0.0km	0%	3.9km	28%	5.2km	32%	1.1km	6%
	Over 50m	14.9km	83%	12.9km	69%	8.2km	60%	6.1km	38%	10.4km	59%
	b) Land Use/Location desined as Corridors area										
	Park/Private	0.1km	1%	0.2km	1%	0.0km	0%	1.1km	7%	0.1km	1%
	Service Road	8.3km	46%	2.2km	12%	1.0km	7%	0.0km	0%	3.3km	19%
	Center of the existing road	9.5km	53%	13.5km	72%	12.7km	93%	11.4km	71%	14.0km	80%
	River/Field	0.1km	1%	2.8km	15%	0.0km	0%	3.7km	23%	0.2km	1%
	c) Number of Crossing Structure	2		9		5		1		4	
	Existing Fry Over	1		5		4		0		3	
	Rail (KCR)	1		4		1		1		1	
	d) Crossing River/Canal										
	Number of Crossing River	0		4		0		2		1	
	Total Length	0m		350m		0m		950m		100m	
	e) Planted Trees (Green belt length/Corridor Length(%))	6.7km	37%	10.8km	58%	11.2km	82%	4.0km	25%	4.3km	24%
	f) Traffic volume 24h count (200	Nawab Siddique Ali Khan Rd 1	172,294	Se-e-Faisal	141,217	University Road	135,052	Korangi Rd.	38,550	Sh-e-Pakistan	155,721
		Nawab Siddique Ali Khan Rd 2	152,445	Rashid Minhas Road	131,146	University Road	126,391			M.A. Jinnah Rd.	151,674
		Kh-e-SherShah	134,184	Rashid Minhas Road	121,997	University Road	97,973			Sh-e-Pakistan	129,760
	g) Environment situation Upper:Min-Max, Lower:Ave.										
	NOx(NEQS: 75ppb)	88-115 ppb		93-111 ppb		119-120 ppb		79-154 ppb		79-139 ppb	
		98 ppb		102 ppb		119 ppb		117 ppb		113 ppb	
	PM_{10}(NEQS: 200μg/m^3)	210-287 μg/m^3		229-309 μg/m^3		159-309 μg/m^3		247-287 μg/m^3		159-309 μg/m^3	
		244 μg/m^3		269 μg/m^3		252 μg/m^3		268 μg/m^3		265 μg/m^3	
	Noise Level (NEQS: 75dB Day time,Industrial	75-76 dB		79 dB		75-81 dB		78-80 dB		75-82 dB	
		76 dB		79 dB		78 dB		79 dB		78 dB	

Note: -The percentage of each item indicates the percentage to the total length of corridor.
-Traffic volume data indicates top 3 of survey result on the corridor. Souce is "Karachi Master Plan 2020".
-Environmment situation data indicate Min-Max of the measure at the several spots. Source is "Feasibility Study & Development of Transportation Control Plan of Karachi Metropolis (2007)"

Source: JICA Study Team

Various conditions that it should be considered in advance of the construction period is shown in Table A5-5-2, and its evaluation result is shown in Table A5-5-3.

Table A5-5-2 Conditions Considered During Construction Period

Items / Rank	The Length of the existing road whose width is under 30m		The Length of designed area in the private land / Service road		The number and the length of crossing the rivers/canals		The length of under ground sector		The length of Planted Tree belt	
1	Blue Line	3.5km	Green Line	8.3km	Brown Line	4points (350m)	Blue Line	8.3km	Red Line	11.2km
2	Brown Line	2.8km	Blue Line	3.3km	Yellow Line	2points (950m)	Green Line	3.3km	Brown Line	10.8km
3	Yellow Line	2.7km	Brown Line	2.2km	Blue Line	1point (100m)	Red Line	1.9km	Green Line	6.7km
4	Green Line	0.0km	Red Line	1.0km	Green Line	0	Brown Line	0.0km	Blue Line	4.3km
5	Red Line	0.0km	Yellow Line	0.0km	Red Line	0	Yellow Line	0.0km	Yellow Line	4.0km
Related Environmental Parameter	Air Pollution, Noise and Vibration		Air Pollution, Noise and Vibration		Water pollution		Soil Waste		Cutting Trees	

Source: The JICA Study Team

Table A5-5-3 Evaluation of the Conditions Considered During Construction Period

Items / Rank	The Length of the existing road whose width is under 30m		The Length of designed area in the private land / Service road		Traffic value of existing road (24hours-maximam)		Air pollution (Comparison with NEQS)		Noise (Comparison with NEQS)	
1	Blue Line	3.5km	Green Line	8.3km	Green Line	172,294	Green Line	Over	Green Line	Over
2	Brown Line	2.8km	Blue Line	3.3km	Blue Line	155,721	Brown Line	Over	Brown Line	Over
3	Yellow Line	2.7km	Brown Line	2.2km	Brown Line	141,217	Red Line	Over	Red Line	Over
4	Green Line	0.0km	Red Line	1.0km	Red Line	135,052	Yellow Line	Over	Yellow Line	Over
5	Red Line	0.0km	Yellow Line	0.0km	Yellow Line	38,550	Blue Line	Over	Blue Line	Over
Related Environmental Parameter	Air pollution Noise		Air pollution Noise		Air pollution Noise GHG		Air Pollution		Noise	

Source: The JICA Study Team

APPENDIX – 6 ECONOMIC AND FINANCIAL CASH FLOW

To ensure fairness of procurement process as well as project implementation, information should not be disclosed for a fixed period.