# **APPENDIX 11:ENVIRONMENTAL IMPACT STUDY**

#### **11.1 Natural Environment**

#### 11.1.1 Air Quality

The main air pollutants in Dhaka city are nitrogen oxides (NOx), sulfur dioxide (SO<sub>2</sub>), particulate matter (PM, usually expressed as PM with diameter of 10 microns or smaller: PM10, or 2.5 microns or smaller: PM2.5), carbon monoxide (CO), ozone, volatile organic compounds (VOCs), and lead. The motor vehicles and traditional brick kilns contribute predominantly to the air pollution. The motor vehicles are major source of PM pollution that contributes to the risk of developing cardiovascular and respiratory diseases, as well as lung cancer. Most of the PM pollution (>80%) comes from the diesel-run vehicles. Hundreds of brick kilns operate during the dry months of November to April in the low lying agricultural land surrounding Dhaka city and generate smoke dust including SO2, NOx and hydrocarbons that contribute to worsening the ambient air and damage of public health.

Dhaka has grown rapidly in motorization in recent years. The total number of registered vehicles in Bangladesh has increased from 0.07 million in 1970 to 0.46 million in 2006. Dhaka has more than 3,000 old minibuses which run on diesel fuel. 80% of these buses are unfit to roll over on the city roads because of their high emissions. Even though aging trucks are not allowed to run into Dhaka city during day time, the trucks effect significant air pollution in Dhaka city particularly during the dry winter months. Despite the phasing out of two-stroke three wheeler baby taxis in 2003, the air quality benefit could not be sustained because of a great number of smoky diesel vehicles. Dhaka city has witnessed a tremendous growth of compressed natural gas (CNG)-run vehicles in the recent years. A sizeable number of gasoline-run vehicles have been converted to CNG vehicles. The refitted engines which run on the dual fuel are posing a real threat to the already polluted city's air, and the safety and security of commuters.

Emission inventory of mobile sources in Dhaka show that contributions of different vehicles dominate specific types of pollutants. Petrol-fueled light-duty vehicles and auto-rickshaws contribute to most of CO, while diesel-fueled buses and trucks contribute to most of NOx. Twoand three-wheeled auto-rickshaws contribute to about half of hydrocarbon emission. PM emission comes mostly from diesel buses and trucks (45%), and auto-rickshaws (40%). According to a study conducted by the Bangladesh Atomic Energy Commission, approximately 55% of the PM10 are attributed to suspended soil and motor vehicle (31%), and PM2.5 is mostly attributed to motor vehicles (29%) and natural gas/ diesel burning (46%).

The average levels of PM10, NOx and SO2 has been increasing since 1990's. However, the annual average levels of NOx and SO2 are  $40 \sim 60 \mu g/m^3$  and  $15 \sim 20 \mu g/m^3$  respectively, and remained below Bangladesh national ambient air quality standards (NOx:  $100 \ \mu g/m^3$ , SO2:  $80 \ \mu g/m^3$ ) in from 2002 to 2007. The most important pollutant from the health point of view in Dhaka is PM. The PM10 and PM2.5 levels continue to exceed Bangladesh national ambient air quality standards (PM10: 24h 150 \ \mu g/m3 and annual 50 \ \mu g/m3, PM2.5: 24h 65 \ \mu g/m3 and annual 15 \ \mu g/m3) especially during the dry winter months which last about 100 days per year.



**Figure 11.1-1** Monthly Average Level of PM10 and PM2.5 in Dhaka City Source: Department of Environment

#### 11.1.2 Water Quality

Dhaka is surrounded by rivers and inter-connected canals which have formed a life-line for city residents. In the last twenty years, migration from rural to urban area, encroachment of the rivers, unregulated industrial expansion, overloaded infrastructure, confusion about institutional responsibility for quality of the water bodies and ineffective enforcement of environmental regulations have caused serious water pollution on the surface water. There is only one sewage treatment plant at Pagla, which is currently operating below the capacity because of the sewerage system failures, and few factories operating effluent treatment systems in DMA. Almost waste from the residents, industry and millions of farm animals, pesticides and fertilizers are dumped into Dhaka's surface water. These wastes infiltrate to the ground and pollute the groundwater.

The surface water of the city is very poor condition, especially in the dry season. For nearly half of the year, the flow rate of the rivers remain negligible, or often only a tidal pulse, but the volume of effluent flowing into the canal and river remains about the same as during the wet season. Consequently, dilution of the contaminants is drastically reduced in the dry season.

Figure 11.1-2 shows the general condition of the water pollution in Dhaka on the basis of Biochemical Oxygen Demand (BOD) and Ammonia levels. The most polluted water bodies are the Buriganga and Sitalakkhya rivers, Tongi Khal and the canal system in Dhaka East, where very low devolved oxygen levels that are 1.5~4 mg/l reflect contamination caused by organic waste, domestic sewage and chemical residues from factories. These water bodies are biologically dead during the dry season. The high levels of BOD (Standard 6 mg/l) that are 10~30 mg/l in the Buriganga and Sitalakkhya rivers reflect mainly the high density of discharging untreated industrial waste water into the rivers. Some tidal backflow of relatively clean water from the Meghna and Dhaleswari rivers results in dilution of contaminants in the southern reaches of both the Buriganga and Sitalakkhya rivers, but the extent of this positive effect is limited. The very high ammonia levels, particularly in the canal system in Dhaka East, the Balu River and the southern reaches of the Buriganga River, reflect the discharge of sewage into these waterways. Ammonia in Dhaka East area increases from about 0.3 mg/l in October to greater than 20 mg/l in March-April, which is twenty times higher than the national environmental quality standard (1.2 mg/l) for ammonia in surface water.



**Figure 11.1-2 Water Pollution of River and Canal System around Dhaka** *Source: Bangladesh Country Environmental Analysis 2006 by World Bank* 

#### 11.1.3 Fauna and Flora

Because DMA has urbanized well, there are few natural forest areas. Significant natural forest exists only in the limited northern part of RAJUK area. However, the vegetation of Dhaka city has a variety of indigenous and exotic species especially in parks and gardens. Approximately 310 hectares in Dhaka city accommodate parks and gardens. It is estimated that there are nearly 41-46 parks/gardens such as Osmani Uddyan, Bahadur Shah Park, National Botanical Garden, Zia Uddyan (Garden), Baldha Garden, Suhrawardi Uddyan, Ramna Park in Dhaka city. Baldha garden and National Botanical Garden have a wide variety of plants and trees. Besides, local species, many exotic species were planted along the roadside, old secretariat area and in residential bungalows for the beautification of the city during 1905-06 when Dhaka was the capital of East Bengal and Assam. About 50 species were then planted, of which Aswath (*Ficus religiosa*), Debdaru (*Polyalthia longifolia*), Narikel (*Cocos nucifera*), Ashok (*Saraca indica*),

Mahogany (Sweitana foetida), Shegun (Tectona grandis), Sissu (Dalbergia sisso) were very common.

Many areas (Mirpur, Dhanmondi, Mohammadpur, etc.) of Dhaka city had been covered by natural vegetation during the earlier days. With increased population, industrial and commercial establishments, and construction of roads and highways, most of the vegetation have been cleared over the years. The Modhupur green area had been a habitat for many animals particularly elephants, tigers, leopards, boars, deer and buffaloes till the beginning of the nineteenth century. Monkeys had also been found in abundance till the mid-nineteenth century. Foxes, jackals, squirrels and otters have almost disappeared now a day. Bats and rats are still seen sometimes within the city area. A large number of bird species were common in Dhaka, particularly pigeons, doves, kingfishers, parrots, jungle fowl, common pea-fowl, kite, fishing eagle, vulture etc. But many of these are now extinct and the rest are rapidly disappearing. One good point is that a large number of migratory birds are found in Dhaka (especially in the lake of the National Zoo) in winter. Various species including ducks, seagull, falcons, harriers, plovers, curlews and sandpipers are seen here during winter.

Many types of poisonous snakes and non-poisonous snakes were very common till 1960s. A few species including Cobra may still be found now a day. The number of amphibians and fishes has gone down in the last few years.

In Ramna Park and its surrounding areas beside Minto Road, kingfishers were seen even during 1997-1998 which have almost disappeared. Some monkeys and mongoose were seen in old Dhaka even in the early 60's but their numbers have decreased considerably. They are almost out of sight now a day. The biodiversity of fish species has been reduced severely due to pollution of surface water. The land ecosystem is also threatened with rapid and unplanned urbanization.



**Figure 11.1-3 Forest Cover Area in RAJUK Area** Source: Forest Department

#### 11.1.4 Nature Reserve

There are no nature reserves such as national park or wildlife sanctuary in RAJUK area. Two botanical gardens as natural classified area exist in DMA and are managed by forest department.

National Botanical Garden, which is located at Mirpur in Dhaka city, covers around 84 hectares of land with approximate 50,000 species of trees, herbs, and shrubs including a large collection of aquatic plants. Baldha garden with about 136 meters in length and 76 meters in width holds around 15,000 plants representing 672 species. Many of the species at Baldha garden were collected from over 50 countries.

Name	Location	Area (ha.)	Established
National Botanical Garden	Ward 8	84.21	1961
Baldha Garden	Ward 77	1.37	1909

Table 11.1-1 Natural Classified Area in DMA

Source: Forest Department

#### **11.2 Social Environment**

#### 11.2.1 Involuntary Resettlement

Loss of land for residence and/or business is critical issue, especially for the poor. In the international donors policy, following principles are common:

- a) To avoid human resettlement
- b) To minimize the scale of resettlement
- c) If the resettlement is unavoidable, enough compensation shall be made in accordance with the international standard

In Bangladesh when people lose their properties (land, building and other facilities), it is common that compensations are given to only those who have registered title and paid up to date tax. No compensation is given to those who do not have any formal title, even if they have been residing there more than 10 years peacefully without any claim to evacuate from those properties. In the international understanding, such people continuously residing there for many years are thought to be the formal title holder although they have no such legal papers. Therefore, compensation should also be given to them accordingly although the amount would not be equivalent to those who have legal papers.

Another issue for resettlement is that the rate of compensation made by the government is quite low compared to the market prices. As a result, they cannot purchase the same amount of replacement land with the compensation money provided by the government. To avoid this, a land price determining community can be established who will properly evaluate the land with market price and reasonable compensation shall be made so that they can be able to purchase equivalent alternative land elsewhere.

#### 11.2.2 Local Economy such as Employment and Livelihoods, etc.

Not only the case for loss of properties, but also the case for loss of business chances/access is quite critical issue. International donor policy specifies that proper compensation shall be made so that their livelihood would not be worsened after the implementation of the project. Thus, compensation includes not only the amount of money what is determined by the government as per law but also necessary assistance to maintain livelihood. This includes provision of money, food, assistance for free transportation of properties, job training, and microcredit.

Together with the compensation for property and job accesses, the following compensation plan is tentatively prepared.

#### **11.2.3** Use of Local Resources

Any land and/or resources affected by the project shall be compensated properly in accordance with law.

#### **11.2.4** Social Institute such as Social Infrastructure and Services

All the stakeholders including local government, community elders, NGOs, institute/university, and religious group shall be properly consulted before implementing of any project.

#### 11.2.5 Existing Social Infrastructure and Services

Alternatives shall be provided during the construction of affected infrastructure. Affected infrastructure shall be properly recovered or improved compared to before considering the necessity after operation.

#### **11.2.6** The Poor, Indigenous of Ethnic People

We surveyed both mobile and sitting vendors, stall vendors, beggars, etc. who may be classified as marginalized/poor people with a number of more than 300 samples. The results can be summarized here as:

- a) Most of the interviewees had no objection about the project subject to proper compensation
- b) They are selling fruits, cake, and other small consumables
- c) They came from outside of Dhaka for making money tentatively, staying alone in slum area
- d) The income ranged from BDT. 50-200

Due to implementation of the project, they might have looked for alternative place to do their business. Mobile and sitting vendors can easily move to another place while the stall vendors might have some difficulties to find the place for semi-permanent occupation together with shifting their stalls.

There are 90,000 indigenous people live in Bangladesh currently, most of them stay in Chittagong Hill Tracts and near the border with Yammer and India, not much in Dhaka.

#### 11.2.7 Misdistribution of Benefit and Damage

Large landlords could obtain big profit by relocation while small scale shop owners and employees, those without having any formal title (and not applicable for formal compensation) may lose their livelihood immediately by displacement. All the project-affected people shall be provided with equal benefits through proper resettlement action plan.

#### 11.2.8 Local Conflict of Interest

Before a large number of people are relocated to another community, enough consultation meeting shall be made for the host community as well as relocated community. Number of people in the host community who may suffer secondary relocation shall be minimized and properly treated.

#### 11.2.9 Gender

Female-headed poor households are in harder position compared to the male-headed poor households. They shall be provided with equal job opportunity and wages like male workers during construction and operation. Contractor shall report monthly on the number of female workers employed.

#### 11.2.10 Children's Right

Impoverishment of mothers inevitably let their children loose various important rights they could have enjoyed. Livelihood rehabilitation plans for the people affected by the project shall include special allowance considering number of family members.

#### 11.2.11 Infectious Diseases such as HIV/AIDS

There are about 13,0001 HIV/AIDS affected people in Bangladesh. Most of them are sex workers, their customers, and drug addicts by needle injection. By the implementation of the project many laborers will flow into the site of which some maybe affected with HIV. To prevent the spread of HIV victims, provision of safety devices as short-term measures and awareness rising through education/seminar for the workers and residents as long-term measures should be undertaken.

#### 11.2.12 Others

Human trafficking is a prevailing issue in Bangladesh. It is often discussed as one of the environmental impacts caused by transport projects. However, this is caused mainly due to poverty and not due to advanced transportation system. By the implementation of the project, national economy will be improved in general, hopefully resulting in the reduction of the number of abductees. The logic that improved transport system enables criminals to fetch victims more easily is not applicable at least in the developed countries. Human trafficking (consented or not consented) happened very often in Japan when it was very poor.

#### 11.2.13 Land acquisition and Resettlement Policies

#### (1) Introduction

Resettlement objectives regarding the principles and guidelines for land acquisition and resettlement proposed in this framework of the Resettlement Action Plan (RAP) are primarily aimed at avoiding or minimizing, to the extent possible, the hardships and impoverishment that land acquisition and displacement may cause, and mitigating any adverse impacts thereof at the household, group, neighborhood and urban levels. All decisions regarding design of the development works will be made, to the extent feasible, to minimize land acquisition, displacement and disruption of livelihood of the poor, and vulnerable urban people.

<sup>&</sup>lt;sup>1</sup> USAID, Health profile Bangladesh,2004

Based on these objectives more are detailed specific principles and guidelines are needed for land acquisition, adoption of mitigation policies and standards, and planning and implementation of land acquisition and resettlement activities in the Resettlement Framework.

In line with the above objectives, the proposed principles and guidelines will be applied to all project activities that will involve land acquisition from private ownerships and/or displace people from the DMA and other area within the study boundary, and/or people will face impoverishment when their assets or income sources are lost for temporarily or permanently, and/or their productive systems will be dismantled, which they might have used for commercial, residential or other purposes with or without formal authorization.

While this framework will apply if any or all of the above conditions are invoked by the urban transport development works, the standard instruments for planning and implementation of resettlement activities may vary depending on the nature and magnitude of the adverse impacts. For the DHUT project the basic requirement is Preparation and implementation of separate RAPs for project, because project will cause land acquisitions and displacement/relocation, which will affect more than 200 people since the project area covers mostly urban areas of the Dhaka.

Therefore, a legal framework outlining the principles and guidelines which will be used to acquire lands and other assets from private ownership, as well as to resume public lands from authorized and unauthorized private uses in Dhaka city; such as squatters, slum people and their rehabilitation assistances for the restoration of the livelihood. For this purpose a detailed policy matrix defining the entitlements, entitled persons, application guidelines and implementation issues, and the institutional/organizational responsibility to implement them will be highlighted in the RAP.

#### (2) Bangladesh Resettlement Policy

The first law on land acquisition in the sub-continent was promulgated in 1870. It was amended by the Land Acquisition Act, 1894 (Act I of 1894). While the land acquisition Act of 1894 is remained enforced, the East Bengal (Emergency) Requisition of Property Act was promulgated in 1948 after the partition of India and this Act was extended from time to time and finally modified by the Ordinance No. II of 1982, namely, '*The Acquisition and Requisition of Immovable Property Ordinance, 1982*'. This ordinance provided certain safeguards for the owners as far as payment of compensation is concerned and also against wastage and misuse of lands.

Therefore, Bangladesh Resettlement Policy is based on the *Acquisition and Requisition of Immovable Property Ordinance of 1982* (ARIPO), and some provisions of which were subsequently amended in 1993 and 1994. The ordinance is the only law that governs all cases of acquisition and requisition by the Government of immovable property (land, crops and structures) for any public purpose or in the public interest. It may be mention that some rules

have also been framed under these Ordinance and Act to facilitate the operation of different provisions related to land acquisition.

Presently, the owners are compensated with money by the DC for acquired property on the basis of its registered market value. The market value of the property (land, structure, pond, etc.) is assessed on the basis of average recorded value for preceding 12 months together with a sum of 50% premium on the market value. This value is known as Cash Compensation by Law (CCL). This law does not permit the affected persons to take the salvageable materials for which they are being compensated. In most cases, the compensation does not constitute the market or replacement value of the property acquired.

Under the 1982 Act, the government is obliged to pay compensation only for the assets under acquisition and then handover them to the requiring body. The ordinance does not cover project-affected people like Non-titled people or without ownership records such as informal settlers or squatters. So, the government has neither any obligation to resettle the affected person nor any provision to restoring their income. But if someone lives in a private homestead with formal permission, compensation is generally paid to the owner for the structure only and not for the land. Under the provisions of the Land Acquisition Act 1994 the government is liable to compensate the project-affected persons of the following types:

- $\checkmark$  Compensation for loss of land by owners only;
- ✓ Compensation for houses and structures affected;
- $\checkmark$  Compensation for loss of crops, trees and perennial; and
- ✓ Compensation to sharecroppers, if applicable.

#### 11.2.14 Donors' Policies to Draw Resettlement Plan

All the donor agencies including, JICA, ADB, WB, etc. have broad principles to minimize displacement and require time-bound action plans to restore or improve incomes of those project-affected persons. The Donors' requirements for resettlement through their policies and plans are (i) avoiding involuntary resettlement where feasible, (ii) minimize resettlement where population displacement is unavoidable, and (iii) ensure that displaced people receive assistance so that they would be at least as well off as they would have been in the absence of the project. Donors' policy on the Involuntary Resettlement is described below.

a) JICA Resettlement Policy

JICA prepared the new guidelines for environmental and social considerations in April 2004. These guidelines cover development studies, preliminary studies of grant aid projects and technical cooperation projects. The objectives of the guidelines are to encourage the recipient governments to take appropriate considerations of environmental and social factors as well as to ensure that JICA's support for and examination of environmental and social considerations are conducted accordingly. Environmental and social considerations

refer to the natural environment as well as involuntary resettlement and respect for the human rights of indigenous peoples and so on.

JICA classifies projects under three categories according to the extent of environmental and social impacts with considering project's scale, the site condition, and the environmental impact assessment scheme in host countries.

Category A: If projects are likely to have significant adverse impacts on the environment and society. Projects with complicated impacts or unprecedented impacts, which are difficult to assess or which have a wide range of impacts or irreversible impacts, are also classified as Category A. Involuntary Resettlement and/or a full Resettlement Plan is required for this type of project, if lot of people to be resettled involuntarily and loss of means of livelihood will be adversely affected. The DHUT project is deemed to be a 'Category A' type project.

Category B: If project's potential adverse impacts on the environment and society are less adverse than those of Category A projects. Generally, they are site-specific, few if any are irreversible, and in most cases normal mitigation measures can be designed more readily.

Category C: If projects are likely to have minimal/little adverse impacts on the environment and society.

Regarding the Involuntary Resettlement the JICA guideline includes three points are as follows:

- i. Involuntary Resettlement and loss of means of livelihood are to be avoided where feasible exploring all viable alternatives. When, after such examination, it is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected.
- ii. People to be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by project proponents, etc., on time. Project proponents must make efforts to enable people affected by projects to improve their standard of living, income opportunities and production levels, or at least to restore them to pre-project levels. Measures to achieve this may include: providing land and monetary compensation for losses (to cover land and property losses), supporting means for an alternative sustainable livelihood, and providing expenses necessary for relocation and the re-establishment of communities at resettlement sites.
- iii. Appropriate participation by affected people and their communities must be promoted (confirmed) in the planning, implementation, and monitoring of involuntary resettlement plans and measures against the loss of their means of livelihood.
- b) ADB's Resettlement Policy

The Asian Development Bank (ADB) has three Safeguard Policies (SP) - the Policy on

Involuntary Resettlement (1995), the Policy on Indigenous Peoples (1998), and the Policy on Environment (2002). These SPs are central to achieve sustained development impact and poverty reduction, which are major development goals of the ADB. In addition, these policies define internal compliance review processes and accountability mechanisms of the ADB as a development institution. For this purpose, ADB has developed Operations Manuals (OM) Sections F2/BP: Involuntary resettlement and F3: Indigenous Peoples to define the relevant procedures and requirements.

ADB classified all infrastructural projects into three categories like JICA policy based on significance of the adverse impacts. The DHUT can be considered as 'Category A' project and ADB's OM Section F2/BP (2006): Involuntary resettlement policy will be applicable for, which provides an effective opportunity for people who dispossessed or displaced to achieve development benefits. The ADB adopted an Involuntary Resettlement Policy (IRP) in February 1994 and formally endorsed it in November 1995. The IRP requires that people who loose assets or livelihood because of a project, irrespective of tenure status, receive assistance from the project for relocation and resettlement, and be paid market or replacement value for assets acquired by the project.

The objectives of the involuntary resettlement policy are:

- i. To avoid involuntary resettlement wherever feasible;
- ii. To minimize resettlement where population displacement is unavoidable by choosing alternative viable project options; and
- iii. Where involuntary resettlement is unavoidable, have to ensure that affected people receive assistance, preferably under the project, so that they will be at least as well-off as they would have been in the absence of the project. Where involuntary resettlement is unavoidable, the policy is designed to include any resulting losses in project budgets. The policy treats involuntary resettlement as a development opportunity and allows planners to manage impoverishment risks and turn the people dispossessed or displaced into project beneficiaries, particularly the poor and vulnerable, who may be disproportionately affected by resettlement.

An 'affected person' is one who experiences such impacts. The affected person includes any people, households, firms, or private institutions who, on account of changes that result from the project will have their

- i. standard of living adversely affected;
- ii. right, title, or interest in any house, land (including residential, commercial, agricultural, forest, and/or grazing land), water resources, or any other moveable or fixed assets acquired, possessed, restricted, or otherwise adversely affected, in full or in part, permanently or temporarily; and/or

iii. business, occupation, place of work or residence, or habitat adversely affected, with or without displacement.

The involuntary resettlement policy is a key ADB safeguard consonant with *the Poverty reduction Strategy* and the *Long-Term Strategic Framework*. 'Involuntary resettlement' addresses social and economic impacts that are permanent or temporary and are:

- i. Caused by acquisition of land and other fixed assets,
- ii. By change in the use of land, or

iii. Restrictions imposed on land as a result of an ADB operation.

The Asian Development Bank (ADB) Guidelines include

"People unavoidable displaced should be compensated and assisted so that their economic and social future would be generally as favorable as it would have been in the absence of the project".

According to the OM Section F2/OP Para 19, a full Resettlement Plan is mandatory for the Category A type project, where resettlement is significant. 'Significant' means, where 200 or more people experience major impacts through physical displacement from housing and/or having 10% or more of their productive, income generating assets lost. Many projects require a Resettlement Framework prior to the full Resettlement Plan.

c) World Bank's Resettlement Policy

The World Bank was one of the first international development aid agencies to formulate a policy on involuntary resettlement. The policy was first issued as an internal Operational Manual Statement (OMS 2.33) to staff in February 1980. Since then, it has been revised several times, most recently as an Operational Directive (OD 4.30) for, *Involuntary Resettlement* in June 1990, and it remains one of the most comprehensive resettlement policy statements.

The World Bank Involuntary Resettlement Policy states that project planning must avoid and minimize involuntary resettlement, and that if people lose their homes or livelihoods as a result of Bank-financed projects, they should have their standard of living improved, or at least restored. The policy was designed to address the plight of millions of people around the world whose homes are destroyed or whose livelihoods are adversely affected as a result of Bank-financed projects. According to World Bank, at least 3.2 million people are being affected by loss of land or livelihood as a result of projects under implementation. So, the Bank is considering revisions of that policy.

The World Bank's policy regarding resettlement includes the provisions of the OP 4.12 and BP 4.12 together to replace OD 4.30, Involuntary Resettlement on the bases to define the resettlement policy objectives, formulate mitigation measures, and plan and implement the

resettlement activities. The World Bank Guidelines Operational Directive 4.30 stated "The objective of the Bank's resettlement policy is to ensure that the population displaced by a project received benefits from it". These OP and BP apply to all projects for which a Project Concept Review takes place on or after 1<sup>st</sup> January 2002.

This Operational Policy statement OP 4.12 was updated in March 2007 consequent to the issuance of OP/BP 8.00, Rapid Response to Crises and Emergencies. Previously it was revised in April 2004 to ensure consistency with the requirements of OP/BP 6.00, Bank Financing. Bank experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where, their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. This policy includes safeguard to address and mitigate these impoverishment risks. The policy includes that A Resettlement Plan is required for all operation that entail involuntary resettlement for more than 200 people are displaced (World Bank OP 4.12, para 17 and para 25 Annex A, 2001).

#### (3) Requirement of Resettlement Action Plan

A full RP is required when resettlement effects are significant. When resettlement is significant, Donor (JICA) should assist the government and other project sponsors to:

- ✓ Adopt and implement the policy objectives and principles within their own legal, policy, administrative and institutional frameworks;
- ✓ Build the capacity of the government and other project sponsors effectively to plan and implement involuntary resettlement.
- ✓ Strengthen the Developing Member Countries (DMC's) capacity and macro frameworks for involuntary resettlement; and
- ✓ Assist the government and other project sponsors in preparation the submitting to the Bank or donor agencies before loan appraisal, a satisfactory RP with time-bound actions and budgets.
- a) Concept of Significance in Resettlement

'Significant' is defined as meaning:

- i. 200 people or more will experience resettlement effect (both Bank's policies)
- ii. 100 people or more who are experiencing resettlement effects are indigenous people or vulnerable as defined in the policy (for example, female-headed households are the poorest, isolated communities, including those without legal title to assets, and

- iii. more than 50 people experiencing resettlement effects are particularly vulnerable, for example, hunter-gatherers. The projects Department concerned would decide, in consultation with the Social Development Division (SOCD), if a full RP is required.
- b) Consideration for the poor:

When a project does not involve relocation of housing, a Resettlement Plan is needed. If assets are lost and livelihoods affected, Bank policy counts this as a resettlement effect, for which there should be a RP.

c) People affected indirectly eligible for compensation:

A definition of 'indirectly' affected people is required, both for identification and implementation purposes. The basis for defining eligibility is the direct loss of assets, subsistence, or income affecting livelihood. To set the limits, the indirect impact of the project should be reviewed and considered carefully. Special measures to assist vulnerable groups might be introduced even if formal compensation payments are not required under the policy.

- d) People affected without Land Titles or Ownership Rights:
  - i. Squatters and vendors: Loss of employment or income from relocation
  - ii. Indigenous or tribal peoples: Loss of traditional and rights and subsistence incomes
  - iii. Tenants/sharecroppers: Loss of lease and tenancy interests in land due to acquisition; loss of improvements and crops on land
  - iv. Land/wage labors: Loss of employment opportunities situation.
  - v. Women and especially female heads of households: Loss of access to land or assets of family members having formal title.

To ensure that some people are not disadvantaged in the process of development, the bank tries to avoid or minimize resettlement effects. If resettlement is unavoidable, the JICA/Bank helps restore the quality of life and livelihoods of those affected. There may also be opportunities to improve the quality of life, particularly for vulnerable groups. All kinds of resettlement losses needs appropriate mitigation measures.

e) Eligible Policy and Entitlements for the project

In Bangladesh, certain inadequacies in the present legal acquisition instrument have necessitated this RAP Framework. Lands are acquired through the 1982 Acquisition and Requisition Ordinance, but its compensation and other provisions do not satisfy the requirements of the World Bank's Operational Policy (OP 4.12) on Involuntary Resettlement, ADB and JICA environment and social consideration policies regarding the land acquisition and resettlement issues. Among other shortfalls, the ordinance is largely indifferent to the landowner's present socioeconomic conditions, or the long-term changes the acquisition and displacement may cause adverse impacts on landowners, squatters, slums, urban vulnerable people and others. Also, no other policies are there to complement this acquisition ordinance to assess, mitigate and monitor the adverse impacts that the

affected landowners may suffer.

Presently, Bank supported projects have addressed involuntary resettlement issues by using the acquisition ordinance and the OP 4.12 together. The ordinance is used to legalize the acquisition in the overall land administration system of the country.

To ensure that some people are not disadvantaged in the process of development, the Bank tries to avoid or minimize resettlement effects. If resettlement is unavoidable, the Bank helps to restore the quality of life and livelihoods of those affected. There may also be opportunities to improve the quality of life, particularly for vulnerable groups. All kinds of resettlement losses need mitigation measures to restore livelihoods.

However, the project compensation policy should be designed to cover compensation for lost assets and restoration or enhancement of livelihoods of all categories (direct, indirect, title holders, and non titleholders) of the project-affected persons (PAPs). They will not only receive replacement land or cash for land and other assets at the market price; but also receive additional supportive measures such as shifting or moving allowance, assistance to commercial and business enterprise to reestablish business, income restoration allowance, and assistance to female headed households to support the PAPS to regain/improve their livelihood in the post resettlement period. Indirectly affected persons who will experience loss of income will receive compensation for income restoration. In summary, land acquisition and compensation policy of the project should be designed to ensure that those affected are not disadvantaged and can regain their lost incomes and livelihoods with in a short period.

The Entitled Persons (EP) will be eligible to a combination of compensation measures, depending on the nature of ownership rights of lost assets and scope of the impact. In general terms, the EPs/PAPs are entitled to following types of compensation:

- i. Compensation for land and other immovable properties;
- ii. Compensation for permanently displacement of small trade business and others;
- iii. Compensation for loss of community resources/facilities;
- iv. Compensation associated with shifting; and rebuilding;
- v. Compensation for loss of wage income/livelihood;
- vi. Compensation for temporary loss of regular wage income;
- vii. Compensation/rehabilitation for the Rickshaw pullers and owners;
- viii. Compensation/rehabilitation/restoration to livelihood of the slum and squatters people; and
- ix. Compensation for temporary Inconveniences and unforeseen impacts, etc.
- (4) Policy framework and entitlements for the Project

The policy framework and entitlements for the Project will be based on national laws: the

Acquisition and Requisition of Immovable Property Ordinance of 1982 (ARIPO), known as Ordinance No II of 1982, some provisions of which were subsequently amended in 1993 and 1994; and ADB's *Policy Requirements on Involuntary Resettlement* (1995), and the agreed this Resettlement Framework.

The policy framework and entitlements for the Project are based on national law (i.e., 1982 Acquisition and Requisition of Property Act), JICA policy on Involuntary Resettlement and social consideration, World Bank and ADB's Policy on Involuntary Resettlement (1995), OM F2/BP 2006.

In the Entitlement Matrix, compensation and rehabilitation packages have been proposed for all types of losses for encountering the negative socio-economic impacts due to involuntary acquisition of lands, displacement of the people and losing their livelihood. The exemplary entitlement matrix for the DHUTS Project is presented in Table 10.2-1

#### **11.2.15 Social Interviews**

(1) Introduction

A rapid three-day social survey was conducted from 5th October to 7th October 2009 by the social consultants with assistance of two enumerators in Dhaka city at the several intersections of the possible Flyover locations under the Urban Road Plans of DHUTS. These locations are;

- ✓ Saidabad intersection
- ✓ Jatrabari intersection
- ✓ English road intersection
- ✓ Mogh Bazar intersection
- ✓ Bangla Motor intersection
- ✓ Shahabag intersection
- ✓ Sonargaon Hotel intersection
- ✓ Sheraton Hotel intersection
- ✓ Mouchak intersection
- ✓ Kakrail intersection
- ✓ Gulsha-1 intersection
- ✓ Gulshan-2 intersection

Total 300 interviews were conducted with the street vendors, rickshaw pullers, van pullers, etc; those are marginalized/poor and vulnerable including some private shops located alongside the roads. The objective of the survey was to know their;

- ✓ Selling article
- ✓ Daily income and profit
- $\checkmark$  How long they are doing business at the locations
- ✓ Their perception towards the proposed project implementation

Interviews were conducted with the following persons:

✓	Street Vendors	172
$\checkmark$	Rickshaw pullers	15
$\checkmark$	Van pullers	9
$\checkmark$	Shops alongside roads in private lands	76
$\checkmark$	Baggers	14
$\checkmark$	Shoe repairing	13
✓	Barber	1

a) Interviewed Street Vendors

A total of 172 street vendors were interviewed at twelve different locations in Dhaka city. Three types of vendors such as Sitting, Mobile and Stall vendors were interviewed as follows:

1	Sitting Vendors	48
/	Mobile Vendors	56
/	Stall	68

Table 11.2-1 shows the results of street vendors' interview. They sale different consumable sale articles such as fruit, water and drinks, rice, cookies and cake, bettle nut, cigarette, garments, flower, and others like plastic goods, etc. Majority of the vendors sells fruit followed by water and drinks, bettle nut and cigarette so on.

 Table 11.2-1
 Types of Street vendors at Different Locations in Dhaka

Locations	Type of	Vendor	s	
	Sitting	Mobile	Stall	Jŀ
				m
Saidabad			1	
Saluabau		9	40	
Jatrabari	2	3	12	
English Road	14	9	8	
Moghbazar	6		10	
Banglamotor	2	2	2	
Shahabagh	4	2	7	
Sonargaon	1	5	2	
Shraton	1	1	3	
Mouchak			2	
Karail	1	9	2	
Gulshan-1	7	5	10	
Gukshan-2	5	11	9	
Total	48	56	68	

i. Age Groups and Family Members

Figure 11.2-1 and Figure 11.2-2 show the age group distribution and family members of the surveyed vendors, respectively. Most of the vendors were in the age group 26-35 years old and maximum 47% of the interviewed vendors' families comprised of 4 to 5

family members.



Figure 11.2-1 Age Group Distribution of Street Vendors



Figure 11.2-2 Family Members of Street Vendors

ii. Education level

Figure 11.2-3 shows education levels of the interviewed vendors. About 44% of the vendors were illiterate and less than 1% was above the Class X.





iii. Daily working hours and working duration at same locations

Figure 11.2-4 shows the daily working hour of the vendors. Maximum vendors reported that they usually work 4 to 15 hours daily. Many vendors told that they were working at the same place less than a year or even a month (Figure 11.2-5).





Vendors in the English road, Mogh Bazar and Gulshan intersections areas are working for more than years.



#### Figure 11.2-5 Working Duration of Street Vendors at same Locations

iv. Per-day income and profit

In this appendix, 'income' indicates same as 'total sales' and the net profit shall be equal or less than that.

Per-day income of 35 % the vendors was less than or equal to BDT 1,000 and 2.5% of the vendors daily income was between BDT 5,001-15,000. Table A10.2.2.2 shows the per-day income status of the interviewed street vendors. Surveyed data indicates that the profit of the vendors is about 5-7% of their daily income.

Daily Income (BDT.)	No. Vendors	Percentage
200-500	25	15
501-1000	34	20
1001-1500	23	13
1501-2000	21	12
2001-3000	30	17
3001-4000	12	7
4001-5000	11	6
5001-8000	11	6
8001-10000	4	2
15000	1	<1

Table 11.2-2 Per day income of Street Vendors

v. Opinion on the Proposed Project Implementation

Surveyed street vendors made multiple responses towards implementation of the proposed project. Table 11.2-3 and Figure 11.2-6 show the perception of the Street Vendors toward implementation of the proposed project. All respondents opined positively for the realization of the project, but only one vendor said negatively for the implementation of the project, because he assumed that he will not get any place to move from here for his business.

Responses on implementation of the proposed project	Frequency
Traffic jam will reduce	155
Traveling Time will be saved	90
Less accident will occur	59
Easy Road crossing possible	58
Easy Movement possible	47
Request/need help from Govt.	42
Good looking area/environment	31
Air pollution will reduce	14
Will ensure more security and facilities will improve	13
Income will be less, so needs financial support from government	11
Others <sup>2</sup>	33

#### Table 11.2-3 Multiple Responses of Street Vendors on Implementation of Project

<sup>&</sup>lt;sup>2</sup> Others include "Need rehabilitation", "Garments worker will reach factory timely", "Slow vehicle should not be allowed", "Traffic management should be developed" and "No place to work, so no need project".





b) Interviewed Rickshaw Pullers

Fifteen Rickshaw pullers were interviewed.

i. Age groups and Family members



Figure 11.2-7 Age group Distribution of Rickshaw Pullers



Figure 11.2-8 Family Members of Rickshaw Pullers

ii. Education level of Rickshaw pullers



Figure 11.2-9 Education Levels of Rickshaw Pullers

iii. Daily working hours and duration of working at same locations



Figure 11.2-10 Daily Working hours of Rickshaw Pullers



Figure 11.2-11 Working Duration at same Locations

iv. Per-day income of Rickshaw pullers



Figure 11.2-12 Per-day Income of Rickshaw Pullers

Rickshaw pullers have to pay rent BDT 40-50 per day to the rickshaw owners from his income.

v. Opinion on proposed Project Implementation of Rickshaw Pullers

Table 11.2-4 and Figure 11.2-13 indicate multiple responses on the implementation of the proposed project. Only one respondent response negatively, while all other respondents expressed their positive opinion towards project implementation. Most of them told that project will reduce traffic jam, traveling time will be saved and easy crossing of the roads will be possible.

Table 11.2-4	<b>Opinion of Rickshaw Pullers toward</b>	l Implementation of the project
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Responses on implementation of the proposed project	Frequency
Easy road crossing possible	5
Traffic jam will reduce	12
Easy movement possible	3
Income/working facilities will be more	6
Time will be saved	5
Will bring more security	1
Good looking area/environment	5
Public movement will be reduced	1
Less accident will occur	7
Don't want because dislocation fear	1



Figure 11.2-13 Opinion of Rickshaw pullers toward implementation of the project

c) Interviewed Van pullers

A total of nine van pullers were interviewed.

i. Age groups and Family members



Figure 11.2-14 Age Group Distribution of Van Pullers



Figure 11.2-15 Family members of Van pullers

ii. Education level of Van pullers



Figure 11.2-16 Education Levels of Van Pullers

iii. Daily working hours and duration at same locations



Figure 11.2-17 Daily working hours of Van pullers



Figure 11.2-18 Working Duration at same Locations

#### iv. Per-day income



Figure 11.2-19 Per-day Income of Van Pullers

They also have to pay rent BDT. 40-50 per day to the owner of van from his income.

v. Opinion on proposed Project Implementation of Van pullers

#### Table 11.2-5 Opinion of Van pullers toward implementation of the project

Responses on implementation of the proposed project	Frequency
Easy Road crossing possible	3
Traffic jam will reduce	9
Easy Movement possible	5
Income /working facilities will be more	3
Time will be saved	1
Good looking area/environment	4
Environmental pollution will be reduced	1
Income will be less, so needs financial support from government	1
Less accident will occur	3



Figure 11.2-20 Opinion of Van pullers toward implementation of the project

#### d) Interviewed Shops Owners/Employees alongside Roads

Types of shops	No. of shops interviewed
Hotel	13
Medicine	9
Vegetable	1
Fruits	3
Hardware	13
Confectionary	1
Others Phone Fax	13
Stationary	17
Garments	5
Sports Good	1
Total	76

# Table 11.2-6Types of Interviewee Shop atDifferent Locations in Dhaka

- Age Group of Shop owners/ employee
- i. Age groups and Family members





Figure 11.2-22 Family Members of Shop Owners/Employees

ii. Education level





iii. Daily working hour and duration of working at same location



Figure 11.2-24 Daily Working Hour of Shop Owners/Employees





#### iv. Per-day income





v. Opinion on proposed Project Implementation of shops owners/ employees

Table 11.2-7	Multiple Responses of Shops Owners/ Employees
	on Implementation of Project

Responses on implementation of the proposed project	
Traffic jam will reduce	
Traveling Time will be saved	46
Less Accident will occur	34
Easy movement/better communication	28
Easy Road crossing possible	24
Good looking area/environment	16
Air pollution will be reduced (Air)	8
More business, income and working facility	
Working hour will be saved	6
Crime will be reduced	4
Income will be less, needs financial support and rehabilitation	4
Need proper utilization by project	
Improved traffic management	1
Material lose will be reduced	1





- e) Interviewed Beggars
  - i. Age groups of Beggars







ii. Family members of Baggers



iii. Education level of Beggars

All interviewed beggars were illiterate

iv. Daily Working Hours and Duration at Same Location of Beggars



Figure 11.2-30 Daily Working Hours of the Interviewed Baggers



#### Figure 11.2-31 Duration of Working in the Same Location of the Beggars

v. Per-day income of Beggars



Figure 11.2-32 Daily Income for Beggars

Their profits are unknown.

vi. Opinion on Proposed Project Implementation of Beggars

Responses on implementation of the proposed project	Frequency
Easy Road crossing possible	4
Traffic jam will reduce	12
Easy Movement possible	3
Income/working facilities will be more	3
Time will be saved	2
Good looking area/environment	2
Income will be less, needs financial support	1
Request/need help from Govt.	8
Need rehabilitation	1
Less accident will occur	3



Figure 11.2-33 Opinion of Beggars toward Implementation of the Project

## f) Shoe repairer and Barber

i. Age groups and Family Members





Average age of Barber was 52 years.





Average size of Barber family is 9.

#### ii. Education level



## Figure 11.2-36 Education Level of Shoe repairers

All Barbers were illiterate

iii. Daily working hours and Duration of Working at same Location



Figure 11.2-37 Daily Working Hours of Shoe repairers



Figure 11.2-38 Working Duration of at Same Locations of Shoe repairers

Barber's working hours was 9 hours and duration working at the same place was 40 years.

iv. Per-day income





Barber's per-day income was BDT 250 and profit is BDT 200 or less.

v.	Opinion or	n proposed	Project	Implementation	of Shoe	repairers
				<b>1</b>		

#### Table 11.2-9 Multiple Responses of Beggars on Implementation of Project

Responses on implementation of the proposed project	Frequency
Easy Road crossing possible	5
Traffic jam will reduce	13
Project is necessary	1
Easy Movement possible	3
Time will be saved	5
Good looking area/environment	5
Income will be less, needs financial support	1
Request/need help from Govt.	2
Need rehabilitation	1
Less accident will occur	4
Don't want because of dislocation fear	1
Income & working facilities will be more	1



#### Figure 11.2-40 Opinion of Shoe repairers toward Implementation of the Project

Barber is happy on the project implementation.

#### 11.3 Natural Disaster and Flooding

#### 11.3.1 River Network

The local surface water hydrology around Dhaka is complex. The Dhaleswari River a tributary of the Jamuna River is located in the south-eastern part of the North Central Region of Bangladesh, close to the confluence of the Padma River (Ganzes) and Upper Meghna River (Figure 11.3-1). The Lakhya River joins Dhaleswari, 11 km downstream of the Buriganga confluence. About 5 km below the Dhaleswari-Lakhya confluence, the Dhaleswari meets the Meghna River, which in turn flows into the Padma River, a further 20 km downstream.



Figure 11.3-1 River Network in North Central Region of Bangladesh



Figure 11.3-2 River Network around Dhaka Area

The Buriganga is fed mainly by the Turag River, which receives flows from local rainfall and spill flows from the left bank of the Jamuna River. The Lakhya River drains a large catchment lying between the central forested areas and the Old Bramaputra. Additional inflows to the system originate from the Balu which drains a small catchment to the west of the Lakhya (refer to Figure 11.3-2). The Dhaleswari-Buriganga-lakhya-Balu River system is tidal during the dry season when upstream inflows are minimal.

## 11.3.2 Current Flood Protection and Drainage

Dhaka city was affected with severe flooding three times recently, 1988, 1998 and 2004 tabulated in Table 11.3-1.

Year	Description		
1988	<ul><li>85% of the city area was submerged with a water depth of 0.3 m to</li><li>4.5 m from the ground level and inundation continuous for 20 days.</li><li>60% of the city habitant was affected.</li></ul>		
1998	Due to heavy rain and spring tide, 56% of the city area was submerged and inundation continuous for 2 months.		
2004	Due to heavy rain and spring tide, flooding was continuous for 2 months. Commerce and industry area of the northeast Dhaka city was damaged for inundation.		

 Table 11.3-1
 Outline of Severe Flood Damage

The highest water level was recorded in the flood of 1988 (Figure 11.3-3).





Source: Dhaka Water and Sewage Authority (DWASA)

After the devastating flood of 1988, an extensive study in the name of Flood Action Plan (FAP) was launched. The FAP had several components, of which Dhaka Integrated Flood Protection Project (DIFPP), namely FAP 8, was designed to look into the cause of and remedial measures against flooding of the capital.

The flood protection of the Dhaka City (260 km<sup>2</sup>) was divided into two phases (DIFPP I & II). Phase-I was for the western side of the city having an area of 136 km<sup>2</sup> namely FAP 8B. Phase-II was for the eastern side of the city having an area of 124 km<sup>2</sup> namely FAP 8A (Figure 11.3-4).



Figure 11.3-4 Current Flood Protection for Dhaka Area

In Phase-I, the Western Embankment cum Road from Tongi Railway Bridge to Keller Morth at Lalbagh was constructed along with the 3 pumping stations as a flood protection measure for the Western Dhaka City having an area of 136 km<sup>2</sup> (Figure 11.3-4, Dyke-1). Existing road from Saidabad to Khilkhet railway crossing via Rampura/Badda and the railway line from Khilhet up to Tongi railway bridge is the interim Eastern boundary of the western landside water drainage area having 8 drainage block under DIFPP in Phase-I. After the above implementation under Phase-I, improvement of the western area against both flood protection and landside water treatment were nearly completed as of 2009.

Following design conditions were adopted in Phase-I.

- a) Embankment level: 100-years return period flood
- b) Landside Water level: 5-years return period rainfall
- c) Design water level for the western drainage area was set at +4.00m PWD with the above conditions.

In Phase-II of the DIFPP, an Eastern Embankment along the Balu River from Tongi Railway Bridge up to Demra (DND Embankment) was proposed by FAP8A (Figure 11.3-4, Dyke-2, refer to 10.3.3 in this chapter).

The DND (Dhaka-Narayanganj-Demra) embankment was constructed by the BWDB in 1968 to protect an irrigation project area of approximately 57 km2 in Narayanganj (Figure 11.3-4, Dyke-3). Distribution of the ground level below PWD 4 m in Greater Dhaka Area summarized in Figure 11.3-5.



Figure 11.3-5 Land Condition (2004)

Source: SMW Land Condition (2004)

Nearly 70% of Western Area ground level is higher than PWD 4 m. There is no inundation in the area where the ground level over PWD 4 m based on the improvement plan implemented by DWASA described hereinbefore. However, due to poor maintenance of the existing drainage facilities by DWASA, local inundation occurred frequently in the above area during rainy season.

# Ground level profiles of WEST-EAST and NORTH-SOUTH of Greater Dhaka are shown in Figure 11.3-6 (A) & (B).



Figure 11.3-6 (A) Profile Index Map



Figure 11.3-6 (B) Profile Index Map

#### (1) WEST-EAST

Ground level of Mirpul to Gulshan area is higher than PWD 4 m. But some area is inundated presently because the ground elevation of that area is nearly PWD +4.00 m of the design water level as shown in Figure 10.3-6 (B) above.

## (2) NORTH-SOUTH

Ground level of Tongi, Uttara and Tejgaon area is higher than PWD 4 m. Area between Uttara and Tejgaon is lower than PWD 4 m as shown in Figure 10.3-6 (B) below, so that the area is affected with local inundation frequently.

#### Flood Situation of Dhaka

Current flood situation of Dhaka is explained with Figure 11.3-7 below.



Figure 11.3-7 Flood Situation

a) Situation 1 & 2 City area is not surrounded with dyke. Land side water by rainfall drains to the river by natural surface drainage when the river water level is low. And city area is inundated when the river is flooding because no flood protection measures between city and the river.

Dhaka city condition of 1988 was in Situation 1 and 2.

b) Situation 3 and 4 City area is protected with dyke from flooding by the river. Land side water drains to the river thorough regulator structure along the dyke when the river water level is low. Land side water drains to the river by pumping drainage when the river water level is high. Capacity of the pumping drainage is insufficient to drain; city area is inundated for the land side water by rainfall not for flooding by the river.

After completion of FAP 8B, the western part of Dhaka is in Situation 3 and 4.

Dhaka Area	Situation	Flood Problem
Eastern Part	1 and 2	River side water
Western Part	3 and 4	Land side water

Current situation explained in the above was summarized in the Figure 11.3-8 below.



Figure 11.3-8 Summary of Current Flood Protection and Local Drainage Situation of DMA

#### 11.3.3 Eastern Dyke Project

First Dhaka Eastern Bypass study was undertaken in 1998 under World Bank TA. The study was updated in June 2006 with a new name of "Updating/Upgrading the Feasibility Study of Dhaka Integrated Flood Control Embankment cum Eastern Bypass Road Multipurpose Project". The main objective of the project is to provide flood protection for the eastern part of Dhaka in order to mitigate damage and loss as a result of flooding by the Balu River and from internal flood water. The project will also deliver transport benefits, but they are secondary to those of flood defense. All the proposals under this project refer to Figure 10.3-9 as below. Total project cost at constant 2005 prices and excluding physical contingencies was estimated at BDT 19.0 billion (US\$233 million) in the report.

Note: Project cost of BWDB portion was estimated at BDT 12,490 million in the report prepared in 2006. The cost was revised at BDT 19,175.33 million with the current prices in June 2009, nearly 1.5 times difference between the both costs.



Figure 11.3-9 Proposals for Eastern Area from Updating/Upgrading the Feasibility Study of Dhaka Integrated Flood Control Embankment cum Eastern Bypass Road Multipurpose Project

Project description is as follows:

- a) Flood protection
  - i. A 100 year standard of protection is adopted.
  - ii. 24 km flood embankment beside the Tongi khal and the Balu river
  - iii. Embankment of 5.4 km having crest width 10 m and 18.6 km, Bypass portion, having crest width 4m
- b) Internal drainage
  - i. The project area is divided into three compartments.
  - ii. The design standard of internal protection is a 5 year storm event.
  - iii. 80 km of the existing khal network, three pump stations and seven regulators
  - iv. Pump operation range is 2 to 4 m PWD and a water level of 4m is the design water level in the project area.
- c) Inner bypass
  - i. A 18.6 km long low level inner bypass with a design speed of 100 km/h and a maximum curve radius of 500 m
  - ii. 10 m crest width at the first stage and 22.0 m crest width at the second stage
  - iii. Crest level set at 5.10 m PWD having a freeboard of 1.10 m above the design water level (Figure 11.3-10).



Figure 11.3-10 Cross Section of the Proposed Embankment

Source: Feasibility Study of Dhaka Integrated Flood Control Embankment cum Eastern Bypass Road Multipurpose Project

#### 11.3.4 Proposed MRT 6 route and Flooding



This section shows conditions of the proposed route of MRT 6 under flooding.

Figure 11.3-11 Proposed MRT 6 and Flooding

Source: The Study on Urban Information Management for Greater Dhaka City, August 2004, JICA

Flood conditions in the above Figure 11.3-11 were simulated under the study on Urban Information Management for Greater Dhaka City. Area with blue color of Figure 11.3-11 shows inundated area when flooding occurs with the water level as indicated in the each figures. Ground elevation of the original MRT 6 alignment is above a water level of MSL 7m as shown in Figure 11.3-11 (IV). However, the ground elevation of the extension portion of MRT 6 is below a water level of MSL 4 m as shown Figure 11.3-11 (I). Design water level of the western drainage area was set at 4.0 m PWD (MSL 3.27 m\*). Therefore, some protection measures are

necessary to protect MRT facilities from landside water when the proposed MRT apply metro style.

\*MSL+0.73m=PWD m



Figure 11.3-12 Proposed MRT 4&5 and Flooding

Source: The Study on Urban Information Management for Greater Dhaka City, August 2004, JICA

Proposed routes of MRT 4 and 5 are as shown in Figure 11.3-12. Section of MRT 4 and 5 below MSL 4 m is longer than that of MRT 6. From this point of view, with the same flood condition, MRT 6's route is slightly safer than that of MRT 4's and 5's.

As a reference, MRT 6 alignment with the proposed station and a profile of the original ground level are as shown in Figure 11.3-13.





Note: Each MRT route and station in the above figures is a tentative proposal, not finalized yet under this study.

#### 11.3.5 Flood water level in 1998

Flood water level in flood of 1998 was recorded under the study on Urban Information Management for Greater Dhaka City based on interview with the vicinity people at the following Bench Mark position of Survey of Bangladesh (SOB) as shown in Table 11.3-2 and Figure 11.3-14.

BM	Flood level in 1998 (MSL)	Coordinate (WGS84)
538	6.000	23 55'10"N,90 25'53"E
542	3.600	23 41'33"N,90 28'26"E
690	7.300	23 50'02"N,90 15'32"E
691	7.300	23 47'15"N,90 19'40"E
6192	7.500	23 52'05"N,90 16'18"E
6193	7.400	23 47'42"N,90 16'15"E
6037	5.800	23 50'46"N,90 24'46"E
6038	6.600	23 42'37"N,90 26'03"E

Table 11.3-2Flood Level in 1998



#### Figure 11.3-14 Flood Level in 1998

Source: The Study on Urban Information Management for Greater Dhaka City, August 2004, JICA

Highest water level of MSL 6.6 was recorded at BM.6038 in Greater Dhaka area. Therefore, a water level of MSL 7 m applies as a reference water level to a feasibility study level design.

#### 11.3.6 Others

Three different type of MRT are considered, such as elevated, at level and underground. Each type requires each flood counter measure and cost as shown in Figure 11.3-15.

	ELEVATED	AT LEVEL	UNDER GROUND
Туре			
Flood Measures	None	Embankment	Watertight structure 24 hours pumping drainage Elevated entrance/exit
Cost	None	Low	High

Figure 11.3-15 MRT Type and Flood Countermeasure

# 11.4 Public Consultation of Dhaka Urban Transport Network Development Study (DHUTS)

#### 11.4.1 General

The Dhaka Urban Transport Network Development Study (DHUTS) covers the development of the city for the year 2025 and has recommended transport projects, which are introduction of rail based mass transit, integration of existing transport systems, traffic management and development of intersections. Such a projects need to be not only technically sound, it needs to be demonstrably acceptable to the public in general and the inhabitants of Dhaka in particular. For this reason, the JICA Study Team of DHUTS planned and undertook a Public Consultation Program. The study applied a participatory approach and conducted a public consultation process to disseminate the findings and recommendations of the study. The consultation targeted the transport professionals, government agencies, educational institutions ranges from school to university, NGOs, news media, transport operators and a wide range of stakeholders.

Outline of meeting is: Host: DTCB Date: 1st February 2010 Time; 10:00-14:00 Location: BRAC Hall Participants: 47 people (of which 3 female).See attendant list attached

#### 11.4.2 Purpose of Public Consultation

It mentioned that the public consultation process was planned in order to disseminate information to the main stakeholders and general public as contained in the draft interim report. The main purposes of the public consultation process were threefold:

- $\checkmark$  to inform the public about the overall findings of the study;
- $\checkmark$  to obtain feedback from the public at large about the projects and components;
- ✓ to obtain feedback of needs of the projects, IEE as a whole and the analysis of alternatives; and
- $\checkmark$  to create a feeling of ownership amongst the general public that this study.

The public consultation process involved PowerPoint presentations by the main client Dhaka Transport Coordination Board (DTCB) of Ministry of Communication (MOC). DTCB presented the findings of the study to the stakeholders.

#### **11.4.3** Method of Consultation

To make the public consultation successful, DTCB invited all known stakeholders by letter at a workshop. The workshop follows the following methods:

- ✓ the Executive Director and the Chairman of the consultation made opening speech on overall objectives and selected projects under the Urban Transport Development Plan;
- ✓ the Team Leader of JICA Study Team of DHUTS pointed out main findings of the study;
- ✓ DTCB presented PowerPoint presentation at the workshop;
- $\checkmark$  Panel discussions: questions and answers; and
- $\checkmark$  an one page questionnaire was supplied to the participants to get formatted responses.

#### **11.4.4 Public Consultation Findings**

#### **11.4.4.1** Public Consultation Discussion

(1) First Session of Public Consultation

At the outset of the first session, the Executive Director, DTCB and the Chairman of the Public Consultation Workshop felt great pleasure to organize the this Public Consultation on Initial Environmental Evaluation of Dhaka Urban Transport Network Development Study (DHUTS). He discussed on needs of the selected projects and the analysis of alternatives. He informed that the JICA was the first donor agency, which came forward to implement Strategic Transport Plan (STP) for Dhaka, which was prepared by Dhaka Transport Coordination Board (DTCB) in 2005 under the World Bank fund.

He added that the JICA Study Team was finalizing Urban Transport Development Plan with selects priority projects. The priority projects were introduction of rail based mass transit, integration of existing transport systems, traffic management and development of intersections. He opined that the Dhaka city's transport problems would not be solved by a single donor, therefore, the World Bank and Asian Development Bank had also shown their interest to participate in development of Dhaka city transport network.

As Executive Director of Dhaka Transport Coordination Board, he always felt the need for developing the transportation system in Dhaka City. Along with transport problems, weakness of Dhaka city's urban development institutions was another issue for quick and integrated development of transport system. He thought, without proper organization, Dhaka city's transport problems would not be solved. So the Government had been initiated to reorganize DTCB and creation of new mass transit operation body.

Finally, he requested the attendees to participate panel discussion, which would be conducted by Panel Chair. He mentioned the main objective of the panel discussion, which was to get feedback from the participants of the JICA study.

The Team Leader of DHUTS also felt great pleasure to take opportunity and say few words about the Public Consultation on Dhaka Urban Transport Network Development

Study (DHUTS). He said that this consultation meeting had arranged by DTCB and JICA Study

Team to get feedback from the stakeholders. He began his speech by endorsing what the Chairman had said about the importance of the study and public consultation on it. There was no doubt that problems related to Dhaka City's transport had a critical impact on the development and prosperity of this city as well as Bangladesh.

He mentioned that the Study Team had been working since April 2009 to understand about current urban structure, person trip and traffic characteristics, public transport system, traffic management, organizational and institutional matters, and environmental condition of the city. After getting all the findings, the JICA Study Team is able to finalize urban transport infrastructure plan. He opined that the team had taken care of short-term solution for the city, which was traffic management.

He mentioned that as a Team Leader of Dhaka Urban Transport Network Development Study, his team members and he had been working hard to get the best transport solutions for the city. He observed that the present transport scenarios because of single road mode, absence of proper traffic management, and there were no other urban transport systems. So, he mentioned that there were enormous possibilities for expansion and introduction of other modes of transport, but it would take time and needs continuous effort from government and donor agencies.

#### (2) Study Outlines Presentation by DTCB

A PowerPoint presentation was presented by DTCB on the outlines of the study. At the beginning of the presentation, the presenter pointed out that the study completed with short and long-term vision. He mentioned that the Strategic Transport Plan (STP) for Dhaka approved the Government. In light of the approved plan, the Study Team prioritized implementable short and long-term projects. He mentioned that because of integrated land use and transport plan, the concerned agencies were not able to implement most of the transport plan in the city. He added that finally, the STP and DHUTS conducted integrated land use and transport plan for the city. He pointed out the major output of the study, which were as follows:

- a) Infrastructure Planning
  - Urban Development
  - Public Transport
    - Bus Rapid Transit (by the World Bank)
    - Mass Rapid Transit
    - Regular Bus
  - Urban Road
    - Road Network
    - Expressway Plan
    - Flyover Plan
  - Inter-Modal Facilities

- Bus Terminal
- Mode Interchange Plan
- Traffic Management Plan
  - Traffic Engineering
  - Traffic Managemnt
  - Traffic Safety

#### b) Institutional Planning

- Institution/Organization
  - Institutional Set up
  - Power and function of Dhaka Mass Transit Authority (DMTA)
  - Organizational structure
- Law/Regulation
  - Constitutional and Legislative Framework
- Implementation Method
  - Government financing
  - PPP, BOT, Concession
- Environment Study
  - Initial Environment Examination (IEE)

The presenter discussed the most of the findings of the study, of them was: (a) daily trip production, (b) users by income groups, (c) land use, on-going and future residential developments, (d) population projection and future population distribution, (e) mass rapid transit, hierarchy, rationale for introduce of MRT, selected routes and its optional structure, (f) major bottleneck of intersections and selected intersections for improvement, (g) traffic management and construction of flyover, (h) responsibility of concerned agencies and institutional setup, and (i) transport development scenario toward 2025.

After the presentation of DTCB, the Panel Chair thanked to presenter. He thanked his for his all the aspects of study findings as well as Dhaka city transport problems, what the city dwellers were facing for the last decades. The panel Chair requested to introduce attendees by themselves. After introduce them, the Chair invited questions for panel discussion.

(3) Panel Discussions

In response of the Panel Chair request, the representative Mr. Mohiuzzaman Khan, BAPA a NGO discussed many points, which were: (a) since 2004, metro discussion has been going on without its implementation and asked how long it would take time for starting of the system, (b) he thanked to JICA, whether they had good or bad intention but came forward, (c) the study missing of pedestrian facilities and cycle lane, (d) total plan was auto based without thinking of energy condition and global warming, (e) he thought that CNG uses increased the car

population, (f) the western technology try to supply in the country, which was old for them, (g) needs supply chain management, and (h) paradigm shifts. The Chairman thanked the opinion and he requested to Professor Shaheda Rahman, Department of Architecture, Bangladesh University of Engineering and Technology (BUET).

The BUET professor opined that MRT was the main concern of the study and asked for consideration of water transport in the study. She requested that findings would be accessible. She opined that the country had many good plans without implementation and the implementation agencies were not sham for it. She also asked for incorporation of EIA in the metro study. Ms. Munima Sultana, reporter of Financial Express told that she had touch with the study and opined that the study had partial lacking. She emphasized on the pedestrian facilities, which was prime consideration for a city transport. The present shortage of electricity needed consideration to construct MRT. She added that real state sector was not invited in the workshop.

Professor Shamsul Hoque, Dhaka City College told his idea for shifting of garments industries from the city, inter-district bus terminals may outside city, waste-carrying trucks of Dhaka City Corporation (DCC) may operate at night, polluted vehicles should be restricted to ply in the city, promote regular bus services and restriction on private car and new road along the Pilkhana (Bangladesh Rifles Headquarter). The Bangladesh Small and Cottage Industries Corporation (BSCIC) General Manager Mr. Engineer Md. Mahbubur Rahman informed their future plan of industrial location. BSCIC plans for shifting of garments industries from Dhaka to Gazaria under Munshiganj District, therefore, Gazaria may integrate with MRT to carry garments industries employers. BSCIC also plans for creation of Automobile Industries Park at Gazaria, so he asked to the chair to deliver the message to RAJUK.

The panel Chair delivered the message to RAJUK representative for incorporation of location in their Detail Area Plan (DAP). Syed Rezaul Karim, representative of Dhaka City Bus Operation Association told that before construction of MRT, fare should be considered properly. Professor Akbar Hossain, Eden College opined that pedestrian facilities should be urgent and introduction of cycle lane would be considered.

After those discussions, the Panel Chair requested to the Team Leader for his response to reply. The Team Leader started his replied with the question from MRT. He told that without electricity, MRT could not be operated and at the underground section, without electricity water could not be withdrawn from tunnel. He hoped that in near future electricity problems would be solved in the city. He agreed that construction of pedestrian facilities were most urgent for the city. He added that the team not considered MRT only but also intersection improvement, construction of flyover, road development and traffic management. Regarding road development, he replied that major road would be developed under donor funds but minor roads

should be under local government. After the Team Leader's responses, the Penal Chair requested to the participant for opinions.

The Assistant Professor, Department of Urban and Regional Planning told that he agreed with mega urban development and integration of land use and transport development. He pointed out many questions, which were: (a) the study was car oriented, (b) the study did not consider rest of the 3.3 million poor people in the city, (c) choosing MRT was good option for the study but there was a question of affordability, (d) he did not agree with the township development of Purbachal and Jhilmil areas by RAJUK, (e) there was no equity aspect in the study, and (f) asked for sampling method of household survey. Mr. Emdadul Haque, Sr. Assistant Chief, MOC opined his ideas that shifting of some government offices outside Dhaka city could be eased the present traffic congestion and we need to think on Chittagong and Dhaka city from now.

Mr. Maruf Rahman, Project Officer, WBB Trust (a NGO) asked for sampling method of household survey and how could accommodate the huge number of people of the city in future. After his opinion, Dr. Abdur Razzak, Assistant Engineer, DCC told that the study did not consider people of Keraniganj. He added that river ports to be integrated and discussed about DCC's proposal for development of intersection. DCC proposed for construction of underpasses at Shahbag, Sheraton, Bangla Motor and Sonargaon intersections.

#### **11.4.4.2 Summary of Findings**

The Penal Chair thanked to all for participants new ideas and replied that some proposals were not direct relationship with the study. The Chair did not fully agreed with the separation of cycle land because of availability of road space. After few words, he summarized the findings from the participants. The summary findings were as follows:

- the study did not emphasized automobile;
- new area Purbachal would be integrated by MRT system;
- at the time of feasibility study and detail design of MRT, all side effects (EIA) would be considered;
- the study had considered integration of water transport;
- the supply of electricity part of feasibility study and detail design of MRT;
- affordability part of feasibility study and detail design of MRT;
- agreed with car ownership control;
- agreed with solid waste collection by DCC at night;
- land use and transport development needed integration;
- Rickshaws most of the expensive mode of transport in the city;
- all people of the city area were the target group under the study; and
- the plan also considered bypass and circular road.

# Mass transit system can resolve traffic mess 2 Teb 2010

Say transport experts

Metro The Dayly Stars

#### STAFF CORRESPONDENT

Public transport comprising mass transit system and organised quality bus service is the answer to traffic mess in the capital, said transport experts at a discussion yesterday.

Dhaka Transport Coordination Board (DTCB) and Japan International Cooperation Agency (Jica) organised the public consultation on Dhaka Urban Transport Network Development Study (DHUTS) at Brac Centre Inn in the city.

Rail-based mass rapid transit system (metro rail) along with efficient bus service can resolve the high transport demand in the capital, said Dr M Rahmatullah, a former director of UN-ESCAP.

Discussants in the audience, however, recommended that the study must look into how to make the mass transit system affordable for the mass people. They also demanded provision for pedestrian facilities and bicycle lane in the transport plan; relocation of factories and industrial units from the city heart, control over use of private cars, feasibility of mass transit system and integration of circular waterwayin the urban transport system.

In a keynote presentation, Additional DTCB Executive Director SM Salehuddin said that over 6,000 buses operate on 150 routes in the capital city in a disorganised manner.

Dhaka is a city of nearly 1.5 crore population without a mass transit system, he said, adding that lack of coordination of actions by different agencies is responsible to a great extent for traffic disarray in the capital.

A total of 23 million trips take place in the city everyday by rickshaws, buses, walking, autorickshaws, private cars and others, said Salehuddin. Of the trips, 38 percent are made by rickshaws, 20 percent by walking, 19 percent by public buses and 5 percent by private cars, he said. Technical study for Moghbazar Flyover starts in a monthor two.

Total number of vehicles plying the city streets was 4,72,159 as found in the Strategic Transport Plan in 2004 while DHUTS found it at 4,81,408 in 2009.

The number of buses increased to 72,037 in 2009 from 61,751 in 2004 while the number of private cars increased to 1,24,134 from 1,04,923.

DHUTS team leader Toshio Kimura said they would come up with a plan on Dhaka's urban transport infrastructure for metropolitan area surrounded by rivers Buriganga, Turag and Balu by March next year.

DTCB Executive Director Md Moshiur Rahman was also present at the discussion.

Article of Newspaper The Daily Stars reporting the first public consultation

#### on 2nd February 2010



Presentation at the first stakeholders meeting, 1st February 2010

# Attachment : Public Consultation for Dhaka Urban Transport Network Development Study (DHUTS)

#### List of Attendants

#### Venue: BRAC Center Inn, Dhaka

#### Date: 1 February 2010

	Name and Designation	Organization
1	Prof.Md Shamsul Hoque	Dhaka City College
2	Abu md Jahangdr	Titas Gas T & D co, ltd
3	Md. Zahid Hasan	DTCB
4	Md. Sanavc Hasv	DTCB
5	Md. Nahmadul Hasan	DTCB
6	Sakawal Hossain	9 deal school and college motijhecb
7	Dr. M. Rahmatullah	Transport Policy Advisor TSMR, Plaip Commission
8	Assistant Prof. Hosne Ari Begam	Viiorasunrisa Noon College
9	Associate Prof. Md. Monjurul Islam	Rajuk Uttara Model College
10	Tawfique Ali Sr. Staff repesis	The Daily Star
11	Abu Hasan Morwztr	RAJUK
12	Director Md. Rafqul Islam	Poot & Telecommunication
13	Director (Traffic -North)Bidhan Tripura	DMP
14	Md. Mubh Udd	BUET
15	Manuf Rahman	WBB Trust
16	M. Emdadul Haque	RRD, M/O Communication
17	Elias Ahmad	BTV
18	Shahidujjnnan	BTV
19	Alangj Swapm	ATN
20	Rebina Mesfefa	Channel-1
21	Wazreona Chowdhury	RTV
22	Md. Sirojuf Islam	BRTA
23	Syed Rezaul Karim	Trans Silva
24	Dr. S.M. Salehnddin	DTCB
25	Prof.Md. Akbar Hossain	Eden College
26	Md. Habibur Rahman	BAF Shaheen College Dhaka
27	Abdullahm	Editor
28	Sajjal Ahmed	DPDC
29	Md. Anisr Rahman	DTCB
30	Eng. Md. Bahauddin	PWD
31	Md. Alanddiu	Dhaka College
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	Name and Designation	Organization
32	Nurvr Rahman	SAMAKAL
33	Mohidml Hoqul	BAPA
34	Dr. Abdur Razzak	DCC
35	Sitavsh S Rajim	BRTA
36	MAH Ulocodhuew	BTV
37	Sushanta Tstun	News and Fan
38	Khalid Arafal	News and Images
39	Munima Sultana	Financial
40	Romeo	New Age
41	Soumen Gwha	ATN NEWS
42	Prof. Ohameda Rahman	BUET Architecture Department
43	Reporter. Munna Raihan	ITTEFAR
44	Kamal Ahml	Bangladesh Balarmage