

DHAKA STRUCTURE PLAN



2016 — 2035



RAJDHANI UNNAYAN KARTRIPAKKHA [RAJUK]
Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
REGIONAL DEVELOPMENT PLANNING (RDP)





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Preface

This plan is being prepared under Regional Development Planning (RDP) Project being funded by the Asian Development Bank (ADB) under City Region Development Project (CRDP, Package No. CRDP/RAJUK//S-01, Loan No. BAN-2695). The Rajdhani Unnayan Karttripakkha (RAJUK) under the Ministry of Housing and Public Works is the implementing agency on behalf of the Government of Bangladesh (GoB). This effort is supported by a team of International and national consultants. The project was launched in Dec, 2012 and is scheduled to be completed in December, 2014.

The main objective of the RDP project is to review the existing DMDP (1995-2015) and prepare a revised and updated strategic plan for Dhaka Metropolitan Region for the period of 2016-2035 considering the shifting underlying philosophies of spatial planning, current situation of this territory and its future vision. Other components of the RDP project are conducting feasibility study for a new satellite city, and capacity building of the RAJUK professionals etc.

The current volume is the draft final output of the first component which is actually the major task under this project. There is a separate report for the task assigned under the second component.

This task has been undertaken to revise the existing Structure Plan (1995-2015) that expires in 2015, and give development direction for the next 20 years (2016-2035). The revision of the Structure Plan is intended to produce an updated strategy keeping in view of the changed circumstances the Metropolitan has gone through since 1995. More importantly, it is envisioned that realistic and feasible alternatives for development be drawn for well-coordinated execution of proposed strategies and plans. Also, it intends to build in-house capacity for preparation and implementation of policies, plans and projects. The Structure Plan is a policy document that sets the ground or serves as the guideline for subsequent local level plans.

The Vision

■ Vision for Dhaka Structure Plan 2016-2035:

“Making Dhaka a livable, functional & resilient metropolis respecting local socio-cultural fabric & environmental sustainability”

The vision stands upon three pillars – Livability, Functionality & Resilience. It also has two conditions– respect towards a. local socio-cultural fabric & b. environmental sustainability. The pillars are forward looking in nature playing the role of driving forces for the plan. The conditions are more of restraining nature, not in limiting sense, but as guiding rails to keep the forward movement in the desired direction. Bringing a simple analogy, if the pillars are the accelerator that gives speed, the conditions are the brakes and steering wheel that guide and control that speed.

Livability here refers to a collection of qualities considered desirable by inhabitants of a locality. It is concerned mainly with the experience from an individual resident's perspective. Consequently, enhancing livability is supposed to enhance the experience of a resident of living within a community in a positive way. Parameters that come forth while judging livability of an area may include, but not limited to, the following:

- Accessibility to services & facilities
- Affordability (housing, transportation etc.)
- Meaningful employment opportunity
- Safety & security
- Cleanliness & hygiene
- Social equity & justice
- Sense of community
- Availability of quality education & healthy facilities
- Attractiveness & adequacy public places
- Walkability
- Healthy natural environment
- Interesting cultural activities
- Opportunities for public participation

The term **Functionality** is related to the efficiency with which the components of an urban system operate. It sees the settlement from above to get the larger picture. In a way, it is the organizational or city manager's perspective that is more concerned with large systems and their functioning than an individual's experience of those systems. The essence of functionality are the effectiveness and efficiency of key systems like:

- Transport
- Drainage
- Social services (health & education)
- Utility/life support systems
- Economy
- Energy
- Natural environment & ecosystem
- Governance

Resilience is perceived here as the capability of a community to prevent catastrophic events and also the ability to recover in case the event occurs. It can be compared with the immune system of human body. Regarding the Metropolitan Region, essential components of resilience are, first, to be aware of the disaster risks that threaten everyday life of its inhabitants and, second, to create the capacity to prevent and recover from any disaster that does occur. Thus it incorporates both the preventive and curative aspects. The vision is to make the Metropolitan Region resilient to:

- Natural & anthropogenic hazards
- Economic downturn/depression
- Climate change impacts

The first condition, **respecting local socio-cultural fabric**, mainly points to being aware of and sensitive to the social and cultural background of the community in question. It also means that the usual norms and ways of life of the people have to be acknowledged and considered when judging the appropriateness of any policy decision taken in the plan. The term local here is deemed significant because the Metropolitan Region and its communities are not of uniform in nature. Therefore, the community in question would be the community that is most directly impacted by any particular policy.

The second condition of **respecting environmental sustainability** intends to make sure that while the pillars try to attain certain milestones concerning the human systems, they don't ignore other systems present in the area that together form the greater whole. The essence of this condition is understanding the inherent interdependency of human beings on many natural & ecological processes. It is the realization that disrupting the natural balance of these systems which apparently seem disconnected to the proper functioning of a city or region will ultimately hamper human systems too because of this high level of interdependency, and will eventually be self-defeating.



SUMMARY

OF LONG TERM PLANNING POLICY FRAMEWORK

26,000,000
POPULATION

6.1 mil
HOUSING

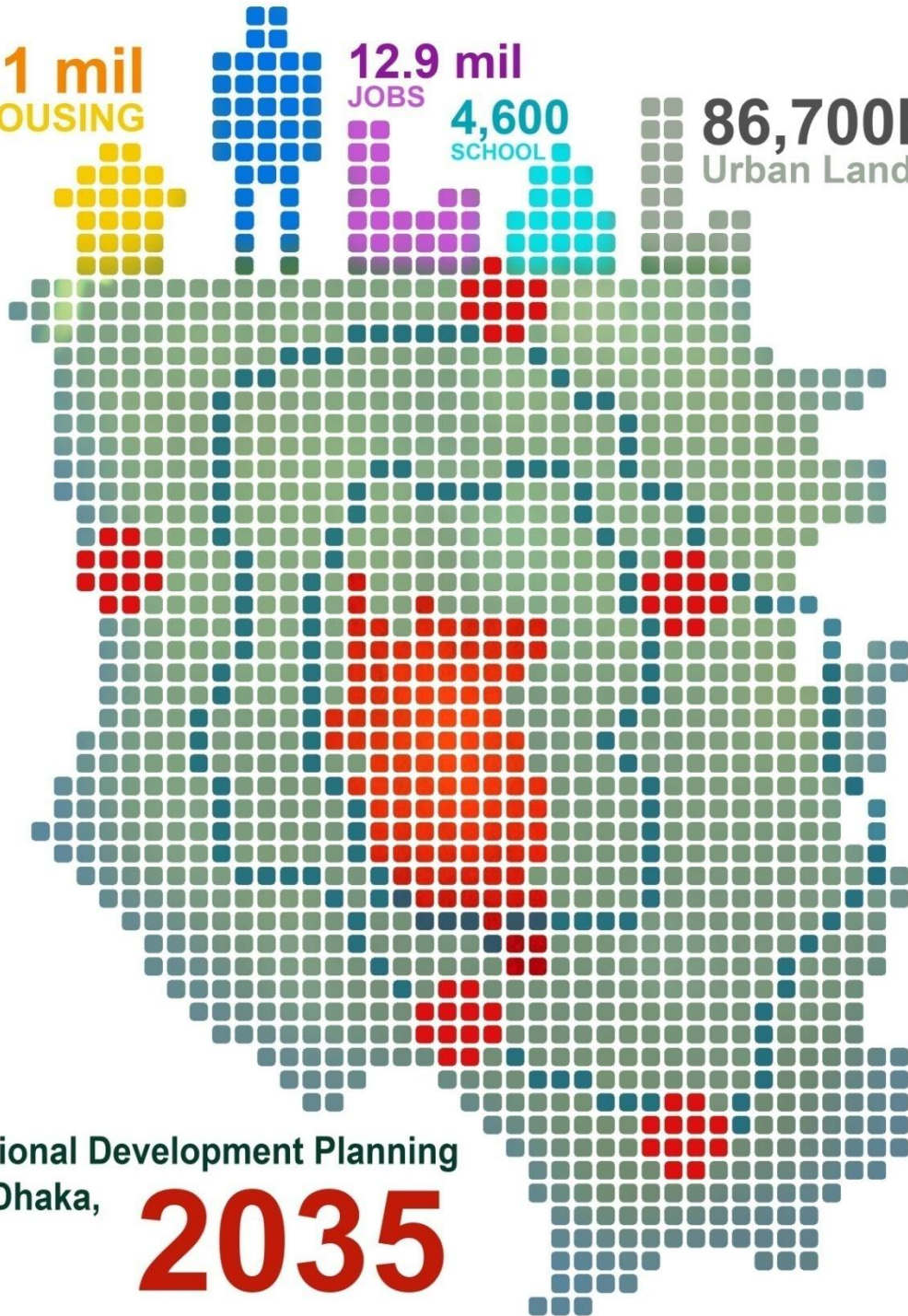
12.9 mil
JOBS

4,600
SCHOOL

86,700ha
Urban Land

Regional Development Planning
for Dhaka,

2035



Summary of Long Term Planning Policy Framework

Promote a Livable City in RAJUK Area

Promote compact urban development and well connected and hierarchical networked city within RAJUK area

Revitalize the old Dhaka and recast and improve the landuse of the underutilized areas of Dhaka Core

Facilitate thriving economic activities by means of sustainable and inclusive planning

Establish effective linkages promoting a vibrant regional connectivity in order to foster the development in regional centers;

Prudently guide the developments in growth management areas within the RAJUK jurisdiction

Establish and operationalize zones and centres

Plan all future developments focusing proposed strategic zones, urban core centre, regional centers, sub-regional centers, specialized centers and community centres

Plan for making urban Centers as attractive place for living

Plan for options required for establishing well connectivity among inter and intra zones and centres

Plan for establishing regional viz-a-viz national connectivity with zones and centres

Gear-up the economy in RAJUK Area

Create employment opportunities specially for the medium and low income groups

Plan for lifting up informal economic activities into higher productive level

Plan and facilitate provision of essential infrastructure and services for the estimated workforce of the priority industrial locations within affordable commuting distance

Facilitate development of ICT sector in the Dhaka Core area

Encourage compact and clustered industrial growth

Plan housing options close to the job locations for major industrial clusters

Provide better public facilities and preserve natural environment

Protect flood plains for reducing flood vulnerability, absorbing heat generated by 'urban heat island', preserving bio-diversity, and providing breathing space

Plan to preserve all possible natural environment in and around RAJUK area

Plan for loop closing system for integrated water management

Introduce effective ETP in all major industrial enterprises and 3R strategy to minimize waste generation

Create energy efficient and comprehensive risk sensitive landuse planning

Plan for school zoning concept to reduce travel demand and provision of specialized health care facilities in each urban centers

Adequate options in plans to preserve and provide sufficient green areas in and around RAJUK area

Plan for reducing the level of environmental pollution

Protect places of special uses, open space and heritage value

Well connected transportation network

Plan for improved public transport services keeping options for walking and cycling

Plan for an integrated mass transport system (BRT/MRT) for RAJUK area keeping options for rail, road and water ways

Plan for ring road and major roads to connect regional centers to increase the mobility

Locate long term transport networks for passengers and freight movement

Keep Dhaka Metropolis moving and tackle traffic congestion

Affordable Housing for City Dwellers

Plan for housing for city population in accordance with the need of the increasing population

Locate housing close to work places in a decentralized manner

Increase housing supply for low and middle income group of people

Create planned and environmentally sound housing neighbourhood

Putting the Plan in Practice

Specify the responsibilities in implementing the plan in effective manner

Plan for capacity building of concerned agencies/ individuals required for implementing the plan

Identify mechanism for facilitating effective coordination among the agencies concerned

Identify a single organization/ institution for looking after city development and management

STRATEGIC DIRECTION

EFFECTIVE LANDUSE MANAGEMENT FOR LIVABLE DHAKA

GOAL	EFFECTIVE MANAGEMENT FOR LAND USE AND SPATIAL GROWTH FOR LIVABLE DHAKA
OBJECTIVE-LDS 01	TO REDUCE GOVERNMENT BURDEN IN PROVIDING ESSENTIAL INFRASTRUCTURE AND SERVICES.
POLICY-LDS 1.1	Utilize PPP Schemes in Major Infrastructure Development in Potential Urban Areas.
POLICY-LDS 1.2	Initiate Participatory Land Development Techniques
POLICY-LDS 1.3	Evolve Methods to Realize Full or Part of Infrastructure Development Cost from the Beneficiaries: Betterment Levy
OBJECTIVE-LDS 02	TO IMPROVE DEVELOPMENT CONTROL SYSTEM
POLICY-LDS 2.1	Strengthen the Inspection/ Monitoring System after Building Plan Approval
POLICY-LDS 2.2	Revise FAR to Suggest Zone-wise Maximum Limit Ratio
POLICY-LDS 2.3	Preparation of Regulations on Land Use for Disaster Risk Reduction.
OBJECTIVE-LDS 03	TO PROMOTE COMPACT URBAN DEVELOPMENT
POLICY-LDS 3.1	Utilize PUD Concept for Block-based Housing Development
POLICY-LDS 3.2	Make the Urban centers as attractive place for living.
OBJECTIVE-LDS 04	PROMOTE LAND USE AND DEVELOPMENT AT MAJOR MASS TRANSIT NODES
POLICY-LDS 4.1	Scaling of Development at Transit Stations
OBJECTIVE-LDS 05	TO MAINTAIN THE INHERENT CHARACTER OF SPECIAL AREAS
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OBJECTIVE-LDS 06	TO REVITALIZE OLD DHAKA
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OBJECTIVE-LDS 07	TO MOBILIZE THE UNDER-UTILIZED LANDS WITHIN THE CITY
POLICY-LDS 7.1	Recast and Improve the Land Use of the Under Utilized Areas
POLICY-LDS 7.2	Shifting of Cantonment and Military Facilities from the City Center

OBJECTIVE-LDS 08	TO EXPEDITE DEVELOPMENT IN THE OUTER AREAS
POLICY-LDS 8.1	Initiate Early Provision of Essential Infrastructures to Attract Potential Residents towards Regional Growth Centers.
POLICY-LDS 8.2	Encourage Private Sector's Voluntary Initiatives utilizing "Incentive/Bonus Zoning".
OBJECTIVE-LDS 09	TO PRUDENTLY GUIDE THE DEVELOPMENTS IN GROWTH MANAGEMENT AREAS
POLICY-LDS 9.1	Guide Planned Development in Growth Management Areas
POLICY-LDS 9.2	Differentiate upper limit of Maximum Ground Coverage (MGC) and Floor Area Ratio (FAR) between the Central Urban Area and the Rest of RAJUK Area
OBJECTIVE-LDS 10	TO ENSURE FOOD SUPPLY
POLICY-LDS 10.1	Take Necessary Actions to Protect Prime Agricultural Lands
OBJECTIVE-LDS 11	TO PROTECT CONSERVATION AREAS
POLICY-LDS 11.1	Consider "Special Conservation Zone" with Stricter Regulations to Protect Rivers and Khals.
POLICY-LDS 11.2	Enact Pre-Emption (Priority Purchase Right by Government) for Transactions within Flood Flow Zones and Water Retention Areas.

STRATEGIC DIRECTION

TRANSPORT FOR EFFICIENT CONNECTIVITY

GOAL	SAFE, AFFORDABLE, SUSTAINABLE AND CONNECTED COMMUNITIES
OBJECTIVE-TRANS 01	TO PREPARE LONG TERM TRANSPORT NETWORK PLAN
POLICY-TRANS 1.1	Enhancing the Linkage between Land Use and Transport Network
POLICY-TRANS 1.2	Construction of Ring Road
POLICY-TRANS 1.3	Incremental Road Network Development
POLICY-TRANS 1.4	Establishment of Hierarchy of Roads
POLICY-TRANS 1.5	Encourage Development of Sidewalk and Bicycle Route for Both Mobility and Recreation Purposes.
OBJECTIVE-TRANS 02	TO MAKE THE USE OF PUBLIC TRANSPORT EFFICIENT AND SUSTAINABLE
POLICY-TRANS 2.1	Introduction of Urban Rapid Transit (BRT and MRT)
POLICY-TRANS 2.2	Promote Better Bus Transport System, Network Restructuring and Route Franchising
POLICY-TRANS 2.3	Integration of Water way transport with Bus network.
POLICY-TRANS 2.4	Introduction of Commuter Trains.
POLICY-TRANS 2.5	Introduction of Efficient Taxi Cab Service
OBJECTIVE-TRANS 03	TO ENSURE EFFECTIVE TRAFFIC MANAGEMENT
POLICY-TRANS 3.1	Integration of Travel Demand Management (TDM) in Planning Process
POLICY-TRANS 3.2	Management of Rickshaw-based Transport (Rickshaw, Rickshaw-van, Carts etc.)
POLICY-TRANS 3.3	Ensure Parking and Management for RAJUK Area
POLICY-TRANS/3.4	Ensure Traffic Impact Assessment (TIA) for Large Scale Development Project
POLICY-TRANS 3.5	Ensure the Road Assets Fit for the Future
POLICY-TRANS 3.6	Bringing Reduction in Fatalities and Serious Injuries on Roads
POLICY-TRANS 3.7	Keep Dhaka Moving and Tackle Congestion

STRATEGIC DIRECTION

AFFORDABLE HOUSING FOR ALL

GOAL	INCREASE THE RANGE OF AFFORDABLE AND APPROPRIATE HOUSING OPPORTUNITIES FOR LOW TO MODERATE INCOME
OBJECTIVE-HN 01	TO INCREASE HOUSING SUPPLY
POLICY-HN 1.1	Promote Infrastructure and Services in the Potential and Designated Housing Areas
POLICY-HN 1.2	Ensure Adequate Supply of Land for New Residential Development
POLICY-HN 1.3	Devise Effective and Workable Housing Financing Mechanism
POLICY-HN 1.4	Expedite and Ease Planning Permission to Increase the Rate of Housing Supply
POLICY-HN 1.5	Public Sector Housing Agencies should Play Greater Role as Housing Facilitator Instead of Housing Provider
OBJECTIVE-HN 02	TO ECONOMISE USE OF HOUSING LAND
POLICY-HN 2.1	Encourage Block Housing Concept
POLICY-HN 2.2	Discourage Plot Based Housing Development Practice both, by Public and Private Sector Agencies
OBJECTIVE-HN 03	TO DEVELOP HOUSING WITH EASY ACCESS
POLICY-HN 3.1	Encourage to Develop Housing Close to the Transit Stations
POLICY-HN 3.2	Encourage Housing Development within the Designated Urban Centers
OBJECTIVE-HN 04	TO INCREASE LOW AND MIDDLE INCOME HOUSING SUPPLY
POLICY-HN 4.1	Public Sector should Provide Affordable Housing to the Low and Middle Income Groups
POLICY-HN 4.2	Improve Conditions in Slums
OBJECTIVE-HN 05	TO ENSURE HEALTHY AND LIVABLE NEIGHBOURHOOD
POLICY-HN 5.1	Create Planned and Environmentally Sound Housing Neighbourhood in the Potential Urban Areas

STRATEGIC DIRECTION

ENHANCING PRODUCTIVITY AND EMPLOYMENT

GOAL	MAKING DHAKA ECONOMICALLY MORE FUNCTIONAL AND PRODUCTIVE
OBJECTIVE-ECON 01	TO FACILITATE INCREASE OF ECONOMIC & EMPLOYMENT DENSITIES IN EXISTING URBAN CENTRES
POLICY-ECON 1.1	Smoothen Supply of Physical and Social Infrastructure in Priority Locations
POLICY-ECON 1.2	Develop Commercial Hubs Within Regional Centres of the Metropolitan Area
POLICY-ECON 1.3	Reinforce Scale and Agglomeration Economies
OBJECTIVE-ECON 02	TO ELEVATE INFORMAL ECONOMIC ACTIVITIES TO HIGHER PRODUCTIVITY LEVELS
POLICY-ECON 2.1	Provide for the Informal Sector's Spatial Accommodation Close to their Market
OBJECTIVE-ECON 03	TO ENSURE INDUSTRIAL DEVELOPMENT SPATIALLY INTEGRATED AND WELL MANAGED
POLICY-ECON 3.1	Promote Compact and Clustered Industrial Growth
POLICY-ECON 3.2	Locate, Declare and Promote Selected areas as Exclusive Industrial Zones
POLICY-ECON 3.3	Plan and Facilitate Provision of Essential Infrastructure and Services for the Estimated Workforce of The Priority Industrial Locations Within Affordable Commuting Distance
POLICY-ECON 3.4	Relocate and/or Cluster Polluting Industries in Suitable Locations
OBJECTIVE-ECON 04	TO HELP FLOURISH APPROPRIATE NATIONAL THRUST SECTORS IN PROPER LOCATIONS IN THE METROPOLITAN DHAKA
POLICY-ECON 4.1	Facilitate Development of ICT Sector in the Core Area
POLICY-ECON 4.2	Promote Woven Garment and Knitwear in Peri-urban areas of the Metropolitan
POLICY-ECON 4.3	Establish Exclusive Economic Zone for Leather Industries in Growth Management Area

STRATEGIC DIRECTION

PUBLIC SERVICES FOR BETTER URBAN LIVING

DRAINAGE AND HYDROLOGY

GOAL FLOOD WATER MANAGEMENT FOR PROTECTION OF LIFE AND PROPERTY

OBJECTIVE-DH 01 TO ENSURE FLOOD PREVENTION

POLICY-DH 1.1 Protection of Flood Flow Zones

POLICY-DH 1.2 Protection of Khals and Rivers

POLICY-DH 1.3 Protection of Flood Water Retention Areas

OBJECTIVE-DH 02 TO PROTECT SETTLEMENT, LIFE AND PROPERTY FROM FLOOD

POLICY-DH 2.1 Build Flood Protection Embankment to Protect Property and Life from Flood

POLICY-DH 2.2 Improve Capacity and Institutional Strength of the Agencies Responsible for Flood Control and Drainage.

WATER SUPPLY

GOAL ADEQUATE SAFE WATER FOR ALL

OBJECTIVE-WAT 01 TO ENSURE SUSTAINABLE AND SAFE POTABLE WATER

POLICY-WAT 1.1 Prevent Pollution of Water Sources

POLICY-WAT 1.2 Introduce Loop Closing System for Water Management

POLICY-WAT 1.3 Provide Adequate Water to the Urban Poor Community at Affordable Rate

POLICY-WAT 1.4 Encourage Harvesting of Rain Water

POLICY-WAT 1.5 Introduction of Dual Distribution System-potable and non-potable

POLICY-WAT 1.6 Ensure Ground Water Recharge Keeping the Building Set Back Space to Remain Unpaved

SOLID WASTE MANAGEMENT

GOAL CREATION OF CLEAN AND PLEASANT LIVING ENVIRONMENT

OBJECTIVE-SW 01 TO ENSURE EFFECTIVE MANAGEMENT OF SOLID WASTE

POLICY-SW 1.1 Ensure Minimization of Waste Generation

POLICY-SW 1.2 Ensure Effective Management and Disposal of Medical Waste

POLICY-SW 1.3 Locate Collection Points at Proper Places and Prevent Public Nuisance

POLICY-SW 1.4 Take Measures for GHG Mitigation and Low Carbon Development

POLICY-SW 1.5 Ensure Greater Private Sector Participation In Waste Management

OBJECTIVE-SW 02 TO PROMOTE HEALTHY LIVING

POLICY-SW 2.1 Introduce Health and Hygiene Counseling and Healthy Practices at Home and Schools

SEWERAGE AND SANITATION

GOAL HYGIENIC AND AFFORDABLE SANITATION FOR ALL

OBJECTIVE-SANI 01 TO ENSURE HYGIENIC AND AFFORDABLE SANITATION FOR FUTURE POPULATION

POLICY-SANI 1.1 Ensure Separate Systems for Transportation of Sewage and Storm Water

POLICY-SANI 1.2 Provision of Network Based Sewerage in Sub-urban Centres

POLICY-SANI 1.3 Promote Adequate Hygienic Public Toilet Facilities in all Busy Areas of Urban Centres

POLICY-SANI 1.4 Evolve Affordable and Hygienic Sanitation for Poor Areas

ENERGY AND TELECOMMUNICATION

GOAL **REGULAR AND SUSTAINABLE ENERGY SUPPLY AND EASY CONNECTIVITY**

POLICY-ENG 1.1 Ensure Energy Efficient Land Use Planning

POLICY-ENG 1.2 Research for Alternative Sources of Fuel/Energy

EDUCATION FACILITIES

GOAL **ENSURE QUALITY EDUCATION LOCALLY**

OBJECTIVE-EDU 01 **TO REVITALIZE LOCAL EDUCATION FACILITIES TO REDUCE TRAVEL DISTANCE**

POLICY-EDU 1.1 Introduction of School District Concept

POLICY-EDU 1.2 Creation of Campus Town

HEALTH CARE FACILITIES

GOAL **HEALTHY LIVING FOR ALL**

OBJECTIVE-HCF 01 **TO PROVIDE HEALTH FACILITIES IN ALL PARTS OF RAJUK AREA**

POLICY-HCF 1.1 Provision of Community Clinic in Each Ward/Union

POLICY-HCF 1.2 Ensure at Least One Hospital in Each Regional Center

STRATEGIC DIRECTION

PROTECTING NATURAL AND HEALTHY ENVIRONMENT

GOAL

PROTECTING THE NATURAL ELEMENTS FOR HUMAN HEALTH AND ECOLOGICAL HARMONY

OBJECTIVE-ENV 01

TO REDUCE THE LEVEL OF ENVIRONMENTAL POLLUTION

POLICY-ENV 1.1

Reduce the Level of Green House Gas (GHG) Emission

POLICY-ENV 1.2

Ensure Discharge of Waste Water at Recommended Quality

POLICY-ENV 1.3

Keep the Level of Air Pollution at Acceptable Level

POLICY-ENV 1.4

Minimize Household Exposure to Unacceptable Noise Level

POLICY-ENV 1.5

Relocate Hazardous/Noxious Industries

POLICY-ENV 1.6

Improving Public Health

POLICY-ENV 1.7

Take Effective Measures to Prevent Soil Contamination

POLICY-ENV 1.8

Creation of Environmental Awareness among People

OBJECTIVE-ENV 02

TO PROTECT DHAKA'S NATURAL ENVIRONMENT

POLICY-ENV 2.1

Keep the Natural Areas for as long as possible

STRATEGIC DIRECTION

PRESERVING OPEN SPACE FOR RECREATION AND AESTHETICS

GOAL	ENHANCING LIVABILITY THROUGH PROMOTION OF OPEN SPACE AND HERITAGE
OBJECTIVE-OS 01	TO PROMOTE QUALITY OF LIFE THROUGH ENHANCING OPEN SPACE
POLICY-OS 1.1	Protect and Preserve Available Recognized Open Space
POLICY-OS 1.2	Mark and Secure Future Open Space in Advance in proposed Urban Areas
OBJECTIVE-OS 02	TO CREATE URBAN LINKAGE THROUGH OPEN SPACE [HUMAN MOVEMENT]
POLICY-OS 2.1	Create Green Network within RAJUK Area
OBJECTIVE-OS 03	TO CONSERVE WATERBODIES AS SOURCES OF AESTHETICS AND RECREATION
POLICY-OS 3.1	Conserve all Conservable Water-bodies to Enhance Local Aesthetics and Make them Sources of Recreation
POLICY-OS 3.2	Involve Community to Integrate the Water Bodies with the City Fabric
OBJECTIVE-OS 04	TO ENCOURAGE URBAN AND PERI- URBAN FORESTRY AND GREENING
POLICY-OS 4.1	Establish Urban and Peri-Urban Forestry and Greenery
OBJECTIVE-OS 05	TO PRESERVE ANTIQUITIES AND MONUMENTS
POLICY-OS 5.1	Prepare Framework Plan and Urban Design Scheme for Heritage.

STRATEGIC DIRECTION

RESILIENCE THROUGH DISASTER PREVENTION AND MITIGATION

GOAL	CREATE HIGHLY RESPONSIVE AND RESILIENT COMMUNITY IN A SAFE AND PROTECTED BUILT AND NATURAL ENVIRONMENT
OBJECTIVE-UDM 01	TO MAINSTREAM DISASTER MANAGEMENT IN THE URBAN PLANNING AND DEVELOPMENT PROCESS
POLICY-UDM 1.1	Preparation of Comprehensive Risk Sensitive Land Use Plan
POLICY-UDM 1.2	Preparation of Multi Hazard Risk Mapping for Dhaka
OBJECTIVE-UDM 02	TO ENSURE EFFICIENT MECHANISM FOR IDENTIFICATION, ASSESSMENT AND MONITORING OF DISASTER RISKS
POLICY-UDM 2.1	Ensure Earthquake Vulnerability Assessment to selected Housing Area
OBJECTIVE-UDM 03	TO REDUCE THE DISASTER RISKS OF HUMAN LIFE, PROPERTY AND COST
POLICY-UDM 3.1	Introduce Retrofitting or Regeneration Mechanism for Faulty, Obsolete and Dilapidated Buildings.
POLICY-UDM 3.2	Monitoring of Flood Protection Embankments around the City.
POLICY-UDM 3.3	Introduce Optimum Plinth Level of Buildings
POLICY-UDM 3.4	Monitor and Forecast Demand for Existing and Projected Fire Fighting and Evacuation Facilities.
POLICY-UDM 3.5	Building Urban Resilience to Floods

STRATEGIC DIRECTION

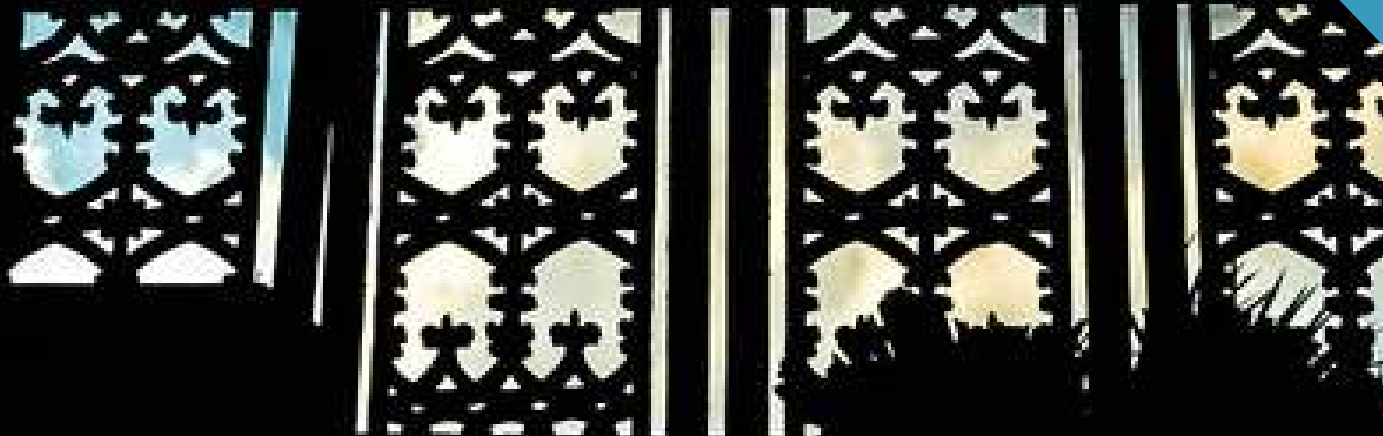
ENHANCE THE CITYSCAPE WITH URBAN DESIGN AND LANDSCAPE

GOAL	INTEND TO ENSURE THE QUALITY OF URBAN LIFE BOTH THE FUNCTIONAL AND AESTHETIC ASPECTS
OBJECTIVE-UD 01	TO SECURE LEGIBILITY OF DHAKA CITY IDENTIFY THE MAJOR SPATIAL NETWORK AND IMPORTANT VIEW CORRIDORS.
POLICY-UD 1.1	Ensure Clarity in Movement Pattern and Orientation by Identifying Major Spatial Network, ensuring Standardized Facilities and retaining their Visual Quality along with emphasis to Important View Corridors.
OBJECTIVE-UD 02	TO ATTAIN COHERENCE AND LEGIBILITY IN DHAKA'S STREETScape OF MAJOR ROAD
POLICY-UD 2.1	Implement Measures to Improve the Visual Definition, Continuity and Streetscape Character of the Major Road Network, to provide Greater Coherence and Legibility within the Urban Areas.
POLICY-UD 2.2	Ensure Plantation as an Essential part of Urban Streetscape.
OBJECTIVE-UD 03	TO PRESERVE THE AVAILABLE IMPORANT VISUAL STRUCTURES AND NATURAL ELEMENTS AS DISTINCTIVE LANDMARKS.
POLICY-UD 3.1	Identify, Enlist and Preserve Formal Large-Scale Visual Structures and Natural Elements to ensure distinctive landmarks of cityscape as orienting devices.
OBJECTIVE-UD 04	TO DETERMINE AND PRESERVE THE DISTINCTIVE SKYLINES AND VISTAS AS THE CITY'S IDENTITY AND SYMBOL
POLICY-UD 4.1	Determine and Ensure Retention and Enhancement of Important Views of City's Skyline and Vista.
POLICY-UD 4.2	Encourage Development of New Landmark Building or Complex at Key Locations
OBJECTIVE-UD 05	TO PRESERVE CHATRACTER OF DESIGNATED AREAS, ENTRIES AND NODES
POLICY-UD 5.1	Control Development in Critical Areas of the city so as to Ensure Visual Primacy of Designated Areas in the City Core, the Protection of Special Character of Areas and the Accenting of Entry Gateways and Activity Nodes.
POLICY-UD 5.2	Retention and Enhancement of Major Planted Areas and River Banks As Visual Backdrops, Orientating Elements and Landscape Amenity.

OBJECTIVE-UD 06	TO DEVELOP GREEN & BLUE (WATER) NETWORK THROUGH FRAMEWORK OF LANDSCAPED CONNECTIONS FOR CREATING FOCUS.
OBJECTIVE-UD 07	TO GIVE IDENTITY OF PLACES ENSURING CITY IMAGE SPACES, NODES, PLAZAS AND PARKS TO BE DEVELOPED AS PER STANDARD.
POLICY-UD 7.1	Identify Incidental Spaces and Nodes and develop them as Parks and Plazas.
OBJECTIVE-UD 08	TO MAXIMIZE THE AMENITY VALUES OF WATERBODIES
POLICY-UD 8.1	Designate Canal, Lake and River Corridors to Improve their Amenity Values.
POLICY-UD 8.2	Formulate Regulations to Control Development Along the River Corridors to Render the Rivers, Lakes and Canals Attractive.
OBJECTIVE-UD 09	TO ENSURE WALKABILITY IN URBAN STREETS
POLICY-UD 9.1	Develop and Maintain Sidewalks in User Friendly Way to ensure Walkability.
POLICY-UD 9.2	Designate and Implement Pedestrian Friendly Legible Street Networks and Green pedestrian networks in continuation.
POLICY-UD 9.3	Ensure Amenity and Safety of Handicapped and Elderly Pedestrians.
OBJECTIVE-UD 10	TO IDENTIFY THE DISTINCTIVE URBAN AREAS AND PROVIDE INTEREST, TEXTURE AND STRUCTURE TO CREATE COHERENT AND HIGHLY IMAGEABLE URBAN FORM
POLICY-UD 10.1	Define, Conserve and Enhance Distinctive Identity Areas, both Old and New to Create Coherent and Highly Imageable City Form.
POLICY-UD 10.2	Integrate the Diversified Areas into a Vibrant, Coherent and Highly Imageable City Form.
OBJECTIVE-UD 11	TO PRESERVE AND CONSERVE CITY'S ARCHITECTURAL AND CULTURAL HERITAGE

OBJECTIVE-UD 12	TO CREATE AN ARCHITECTURAL DESIGN FOR THE CITY COMPATIBLE TO LOCAL CLIMATE, BUILT ENVIRONMENT AND NATURAL CONDITION
POLICY-UD 12.1	Ensure a High Standard of Architectural Design Appropriate to the City's Regional Tropical Setting and Sympathetic to the Built and Natural Conditions.
POLICY-UD 12.2	Ensure the Historical and Original Character of National Assembly Building Complex Areas and Traditional Areas of Old Dhaka during any Redevelopment Attempt.
OBJECTIVE-UD 13	TO PROTECT INHERENT CHARACTER OF VARIED URBAN PATTERN
POLICY-UD 13.1	Devise Separate Planning Rules to Preserve Intrinsic Character of Areas with Distinctive Urban Pattern
OBJECTIVE-UD 14	TO ENSURE A CONVENIENT AND ENJOYABLE ENVIRONMENT OF PUBLIC REALM
POLICY-UD 14.1	Formulate Urban Design Guidelines Ensuring a Convenient and Enjoyable Environment of Public Realm
POLICY-UD 14.2	Formulate an Urban Design Framework for RAJUK Area to Ensure Public Safety and Health

CHAPTER 01 SETTING THE CONTEXT



CHAPTER 01

SETTING THE CONTEXT

1.1 Dhaka Structure Plan: Nature & Function

The Structure Plan provides long term strategy for the 20 years to 2035 for the development of Dhaka Metropolitan Region. It sets a long term indicative and flexible strategy that will show the future pattern or direction of coordinated urban development and will serve as the framework for local level plans. The Structure Plan consists of a report which is a policy document with various supporting maps and an appropriate scale composite map depicting the key elements of the major strategic decisions. It also includes a future broad land use plan. The report identifies the order of magnitude and direction of anticipated urban growth and defines a broad set of sectoral policies considered necessary to achieve the overall plan vision and objectives.

The Structure Plan covers the existing and extended areas of RAJUK's development control area. The major functions of this plan will be as follows:

- **Setting of broad vision and goals consistence with the national policies**
- **Population dynamics**
- **Broad development direction**
- **Urban growth management strategy**
- **Broad land use and housing**
- **Transportation strategy**
- **Infrastructure development guidelines**
- **Environmental protection/ conservation strategy**
- **Economic and investment strategy**
- **Institutional arrangement & division of responsibility**

The Structure Plan, both in its preparatory and implementation stages, aims to provide a coordinated and consistent framework for the development of the plans and programs of all public and private sector agencies within the metropolitan area.

Box 1.1: Strategic Planning & Urban Strategic Plans

Strategic planning is a popular and general process applied across many disciplines from military to business organizations to decide upon a long term direction and pathway. It became prominent in corporations during the 1960s and remains an important aspect of strategic management.

(Strategic Planning is) a systematic process of envisioning a desired future, and translating this vision into broadly defined goals or objectives and a sequence of steps to achieve them. In contrast to long-term planning (which begins with the current status and lays down a path to meet estimated future needs), strategic planning begins with the desired-end and works backward to the current status. Also, in contrast to tactical planning (which focuses at achieving narrowly defined interim objectives with predetermined means), strategic planning looks at the wider picture and is flexible in its choice of means. (<http://www.businessdictionary.com/definition/strategic-planning.html>)

This approach has now long been applied to the urban planning process as well. As cities became more complex and dynamic, and their change more rapid and unpredictable, the old inflexible master plan method started becoming quickly outdated. The UN HABITAT gives this short definition of an urban strategic plan:

A plan and a document that describes the objectives, strategic priorities, proposed interventions, action plans and projects for a city, that follows the agreements reached through a participatory consultation process.

The nature of urban strategic plan was aptly put out in the DMAIUDP Study conducted on Dhaka:

A Strategic Plan can be distinguished from more formal planning process, such as development and master plans, in that it accepts and recognize the uncertainty of future events by concentrating on fundamentals and leaving more detailed problems for resolution nearer the time they occur. In this way, it is to a certain extent open-ended, providing a broad policy framework for action plans and development programmes ...

A strategy, as opposed to a plan, recognizes that the future is not certain, and that it is not possible to predict with confidence the future circumstances of the city...

...The purpose of a strategy is to... provide a coordinated basis for development agencies to proceed knowing that they are all working to a common goal.

1.2 Structure Plan Area: The Dhaka Metropolitan Region

As Dhaka city's primacy started growing, it began reflecting geographically also. More and more people began commuting to their workplace located within the core city from surrounding settlements like Narayanganj, Gazipur, Tongi, Savar, Keraniganj etc. A functional relationship thus started emerging between the core city and those smaller urban centres. This formed the basis of the current metropolitan which incorporates the core and these comparatively newer centres. This is typical of most of the mega urban regions of the world today.

The institutional response to this phenomenon was, first, the formation of the Capital Development Authority, currently RAJUK, in the mid '50s. RAJUK originally had a boundary smaller than its current jurisdiction. As the influence zone of the core city expanded geographically, it adjusted the control area in the late '80s. This structure plan covers the current extent of RAJUK's control area of 1432sq.km¹, and proposes an additional 96 sq.km (a total of 1528sq. km) incorporating the extended area of Gazipur City Corporation and remaining part of Dhamsona Union of Savar Upazila **Map-1.1**. Details of RS Mouza list have been provided in **Annex-1.1**.

There is still multiplicity, though, in defining the metropolitan region of Dhaka. While the Bangladesh Bureau of Statistics (BBS) used to define 'metropolitan' entirely for its census purposes as Statistical Metropolitan Area (SMA), the 'Dhaka Metropolitan Development Plan' (DMDP) which is the prevailing highest level strategic plan for Dhaka, has an area which incorporates the 1991 SMA but also extends eastward to include the area of RAJUK jurisdiction that was left out of that SMA. Quite obviously, the 'metropolitan' of BBS and RAJUK did not refer to the same geographical extent. In addition, there is currently another popular notion of metropolitan i.e. the jurisdiction area of the Dhaka Metropolitan Police. This includes the Dhaka North & South City Corporations and the Eastern and Northern Fringe areas, bounded by the rivers Buriganga, Turag, Balu, the Tongi Khal, and the Dhaka district boundary on the south. This also is a fragmented interpretation based solely on a particular institutional need.

Box 1.2: The Concept of Metro Region

A metropolitan region or a metro region usually refers to a densely populated core city and surrounding territories strongly influenced by the core city in terms of industry, infrastructure and housing. It usually comprises multiple jurisdictions and municipalities as well as satellite cities, small towns and intervening rural areas that are socio-economically tied to the urban core, typically measured by commuting patterns. As social, economic and political institutions have changed, metropolitan areas have become key economic and political regions.

A metropolitan combines an urban agglomeration (the contiguous, built-up area) with zones not necessarily urban in character, but closely bound to the center by employment or other commerce. These outlying zones sometimes may extend well beyond the urban zone to other political entities. In practice, the parameters of metropolitan areas, in both official and unofficial usage, are not consistent.

A polycentric metropolitan area (like Dhaka) is one not connected by continuous development or conurbation, which requires urban contiguity. It is sufficient that a city or cities form a nucleus that other areas have a high degree of integration with. Because of this interdependency, the whole region has to be considered as an intertwined system. Only then can it be planned and managed to keep its functionality high and its balance intact.

¹ Although the total area of RAJUK jurisdiction is mentioned as 1528sq. km in perhaps all official documents up until now, this study has calculated the actual existing area as 1432sq. km based on GIS software computation which after addition of the proposed extension stands at 1528sq. km.

This structure plan, therefore, intends to streamline the variety of definitions and the resulting confusion regarding the extent of Metropolitan Dhaka. As stated above, this plan incorporates the current boundary of RAJUK and proposes some extension in the North and North-eastern parts. This whole territory, incorporating the extension, will be termed as the Dhaka Metropolitan Region throughout the rest of this plan. The plan proposes to establish this term to refer to this total geographic extent for any planning and development purpose relating to this area.

The metropolitan region is quite large and has varying settlement patterns and characteristics in different parts. For ease of planning and management, the entire region has been split into smaller functional areas called 'Regions'. These are not to be confused with any kind of zoning. Basically this serves the purpose of reducing the area of focus so that a more segregated picture can be found regarding trends and patterns of growth and change. Key policy decisions, therefore, can be made accordingly.

The extents of these regions are as follows: (refer to Map-1.2)

- **Central region:** Dhaka City & fringe
- **Eastern region:** Tarabo, Bhulta, Purbachal & Kaliganj
- **Northern region:** Tongi, Gazipur and vicinity
- **Southern region:** Narayanganj
- **Western region:** Savar, Dhamsona and surrounding
- **South-western region:** Keraniganj

1.3 Dhaka in Regional and National Context

1.3.1 Primacy of Dhaka

Dhaka is the capital of the country located in a strategically central geographical position that accommodates about 10% of the nation's population. Dhaka is the most industrialized region accommodating the largest number of garment and knitwear factories which earn the highest amount of the foreign exchange for the country. About one third of the national urban population lives in Dhaka that also provides the highest number of jobs. The city produces more than one third of the nation's GDP. In the year 1990 Dhaka was ranked as the 24th largest mega city in the world. According to World Urbanization Prospects 2014 published by the United Nations, the population of Dhaka is now the 11th largest megacity. It also forecasts that Dhaka will be the 6th largest megacity of the world with a population of 27.37 million in 2030.

1.3.2 Socio-economic & Cultural Influence

The share of non-agricultural sector (commerce, trade, industry, service, etc) of Dhaka has increased from a low of 25% in 1972/73 to over 50% % in 2009. In Bangladesh urban dwellers constitute about 25% of the total national population, but their contribution to GDP is more than 50% and Dhaka city is playing a great role in this regard. Urbanization in Bangladesh is very high and the main reason is that the agricultural sector of the country is unable to absorb the constantly growing labour force. Agriculture sector is unable to provide employment and sufficiently higher household income to meet the increasing household expenditure. This encourages rural people to look for alternative employment in urban areas leading to rural-urban migration, where Dhaka is the most preferred destination. Dhaka is the largest provider of none-farm employment where industrial and business services are the highest of all the cities of the country. It accommodates 80% of the garment and knitwear manufacturing. Also finance and real estate services are the highest in this city of all the four major cities.

Regionally, Dhaka city draws a large number of commuters daily from its hinterland, one and a half hour distance from the city core. They come to the city to provide commercial services, to serve as workers in factories or offices, study in educational institutions, to seek medical services and others come to perform many administrative and judicial services. Excellent regional road, rail and waterway communication enables people to commute to Dhaka. Dhaka's kitchen markets procure their daily sales mainly from the regional producers. The essential consumer goods produced by the Dhaka based manufacturing units find their markets in the regional centres through distribution system. Excellent connectivity enables Dhaka city's rich technology, knowledge and culture to diffuse in the surrounding region, thus promoting social and cultural development.

Dhaka City is the political and cultural mind setter of the nation. Socio-cultural activities performed in this city are replicated in other parts of the country. As a unitary system of government all political and administrative decisions are made here. It is the fore-runner of technological development and adoption. As Dhaka is the most important centre of employment, almost all educated people swarm into this city for a decent job in the service sector. Thus it has turned into a store of multifarious professionals groups wherefrom employers can easily draw their right staff. With the expansion of garment and knitwear export that employ mainly the female, young girls from all over the country come to this city to add to their family income. They send a share of their income to their village homes regularly. In this way Dhaka is playing a great role in women empowerment and bringing the country out of the clutches of poverty.

As the most industrialized city, Dhaka produces a huge variety of consumer and capital goods and services and the entire country serve as a big market for these produces. Again, Dhaka's huge population is served by the food and non-food agricultural items produced by the entire country.

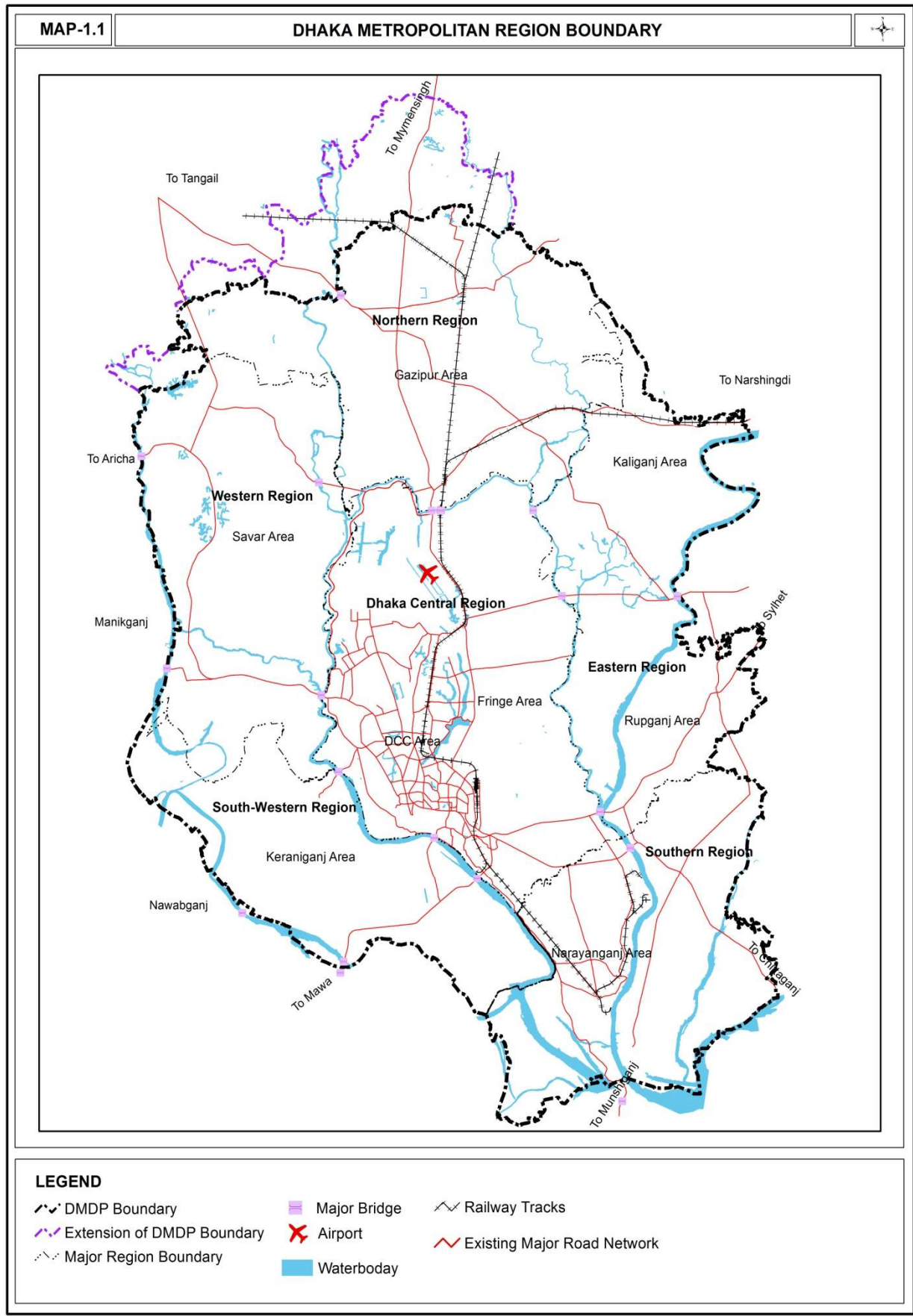
In this way Dhaka has established an integral political, social and cultural relationship with the entire country. And with its leadership in all development sectors it is virtually leading the entire nation in the path of development.

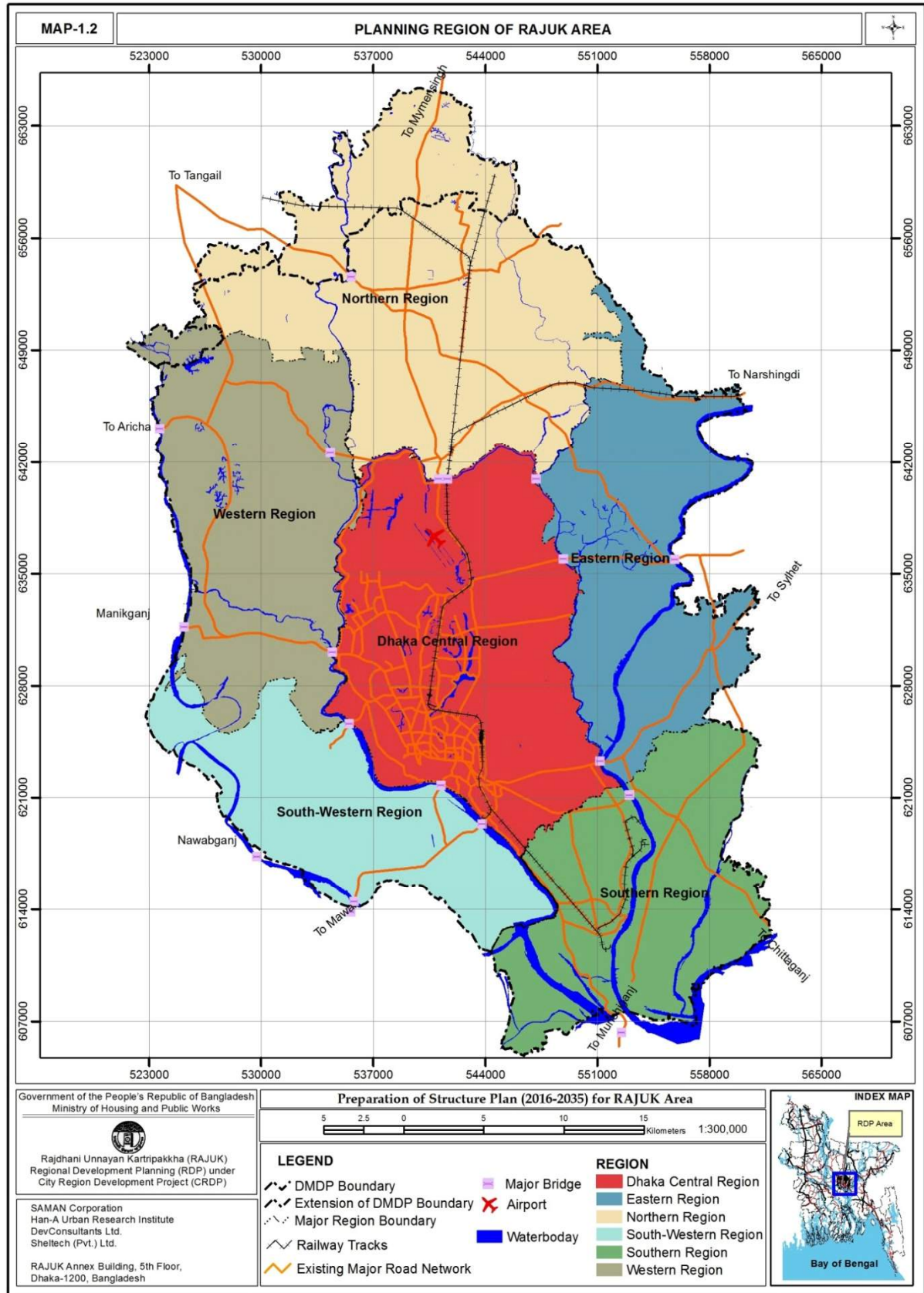
1.4 Rural to Urban Transect

The focus area for this plan constitutes of almost all the characters described typical of a metropolitan region described in the box. On one hand, there are areas within the metropolitan region like Lalbagh in the old city with a density of around 600ppa (persons per acre).

On the other hand, there are areas with density of one hundredth of those areas (around 6ppa) e.g. Pubail Union of Gazipur & Daudpur Union of Narayanganj. These are still mostly rural agricultural in nature. And there are also areas, of course, of varying nature in between these two extremes.







1.5 Past Plans: Review & Implications

1.5.1 Dhaka Metropolitan Development Plan (DMDP)

Dhaka Metropolitan Development Plan (DMDP) was prepared in 1995 by RAJUK for its entire 1528 sq.km area. It was a package of three plans- Structure Plan, Urban Area Plan and Detailed Area Plans. Each plan category was designed to meet particular need. The project was funded by UNDP, World Bank, Asian Development Bank and executed by UNCHS/HABITAT in Dhaka.

The prime objective of the project was to prepare a hierarchical multi-sectoral development plan comprised of Structure Plan, Master Plan and Detailed Area Plan. The nomenclature of mid-level plan that is Master Plan, was, however, later changed to Urban Area Plan to avoid confusion with the plan title mentioned the Town Improvement Act 1953.

a. Structure Plan 1995-2015

The structure plan identifies the magnitude and direction of spatial growth within DMDP area and sets forth spatial and sectoral policies over a longer period of time (1995-2015). The major and critical strategic decisions as well as policies regarding spatial growth are reviewed here.

No.	STRATEGIC DIRECTION (1995 -2015)	COMMENT
1	Densification of existing built up area	Undefined clarification and instrument to ensure densification
2	Accelerating development in the urban fringe	Unplanned and spontaneous development in the urban fringe
3	Infrastructure Led Development Initiatives (ILDI)	Program not initiated by RAJUK
4	Dispersing satellite development in Tongi & Savar	Spontaneous growth in Tongi & Savar

No.	SPATIAL DEVELOPMENT POLICIES (1995 -2015)	COMMENT
1	Preserving high quality agriculture land in northern–eastern fringe and Savar	In conflict with industrial development in Savar area.
2	Implementing Narayanganj–Narsingdi FCDI project for food production & agricultural development	Successfully executed but non-farm activities problems arises unexpectedly
3	Protecting flood flow zones along Shitalakhya River, Balu River, Turag River, Buriganga River and Dhaleshwari River	Inadequate control over proposed land use, 30% flood flow zone encroached
4	Ensuring sustainable water supply to the city from Shitalakhya & Balu River with pollution	Pollution control targets not been achieved
5	Retention ponds by FAP-8A & FAP-8B to be protected by land use control	Land use control being ignored by private land owners, no effective measure by the government.
6	Shifting of Hazaribagh tannery to Savar area	A tannery estate has already been set up, shifting in process.
7	Securing function of special area, such as, National Mausoleum, Savar Cantonment, high security industrial park at Gazipur, Lalbagh Fort, Bishwa Ijtima and Hazrat Shahjalal International Airport protect them from urban incursion	Not fully secured and protected from urban incursion.

No.	SPATIAL DEVELOPMENT POLICIES (1995 -2015)	COMMENT
8	Tongi, Savar, Dhamsona, Gazipur and Narayanganj area were recommended for location of industries	Spontaneous growth of footloose industries in these areas.
9	No new area to be designated for industrial estate until Tejgaon and Tongi industrial estates operate at full and optimum capacity	Tongi industrial estate is almost saturated. Tejgaon industrial estate is under a transition of changing land use
10	Encouraging footloose industries located to special designated zone of Tongi, Savar, Gazipur and Dhamsona	Successfully executed
11	Encouraging informal sector industries with relaxing the regulation and by providing affordable serviced plot	No action was taken to provide incentive plots to informal sector
12	Public administration and government institutions not requiring central locations to be encouraged to disperse to growth area	No attempt was made
13	Gradual dispersion of commercial activities to suburbs and to new growth area	No specific policies was given
14	Upgrading transport services to and within CBD including old Dhaka	Not implemented adequately
15	Conversion of old airport site into a central park and National sports complex	Not implemented
16	Creating major recreational open space along retention ponds	Some planning attempt was taken in DAP but not implemented
17	Creating Eastern bypass on flood protection embankment along Balu River on priority basis	Eastern bypass was not developed.
18	Incremental transport network development	Partially executed; flyover is under construction
19	DITS immediate action plan regarding Dhaka's bus service be implemented	Not implemented
20	Early completion of JICA recommended FAP 8A & FAP 8B for flood control and drainage	FAPs were partially executed. Embankment on western fringe was built but not on the eastern fringe

The review of the status of implementation of the Structure Plan gives an alarming picture. Most proposals were vastly ignored and remained unattended. DMDP Structure Plan proposed 31 policies under different sectors like, spatial and environmental sector, socio-economic sector, infrastructure sector etc. of which only 8 Policies were partly implemented and 23 policies (a staggering three-fourth) were not implemented at all. As a consequence, the city failed to gain the benefits of the policies and recommendations of the DMDP Structure Plan.

b. Urban Area Plan 1995-2005

Urban Area Plan (UAP) is the second tier of the three stage DMDP plan package. The urban area plan (1995-2005) provides mid-term strategy for ten years from 1995. It defines the geographic boundary that will cover the mid-term proposals that cover mainly the urban areas. Part-1 of the UAP report describes the Spatial Planning Zone (SPZ), existing infrastructure locations, and public and private sector development commitments therein. Part-2 of the report is about the approach towards management of Urban Land Use Zones. Part-3 of the report contains the interim planning and development rules. UAP, to implement, its proposals divided structure plan area into 26 strategic planning zones. Then proposals were made for each zone.

● Review

There has been a mixed status of implementation of the proposal of the Urban Area Plan. About half of the proposals were implemented consciously or unconsciously, i.e. not under a central framework, by various development authorities including RAJUK, while many of the proposals were left out. Following is a short overview on the status of implementation of Urban Area Plan proposals.

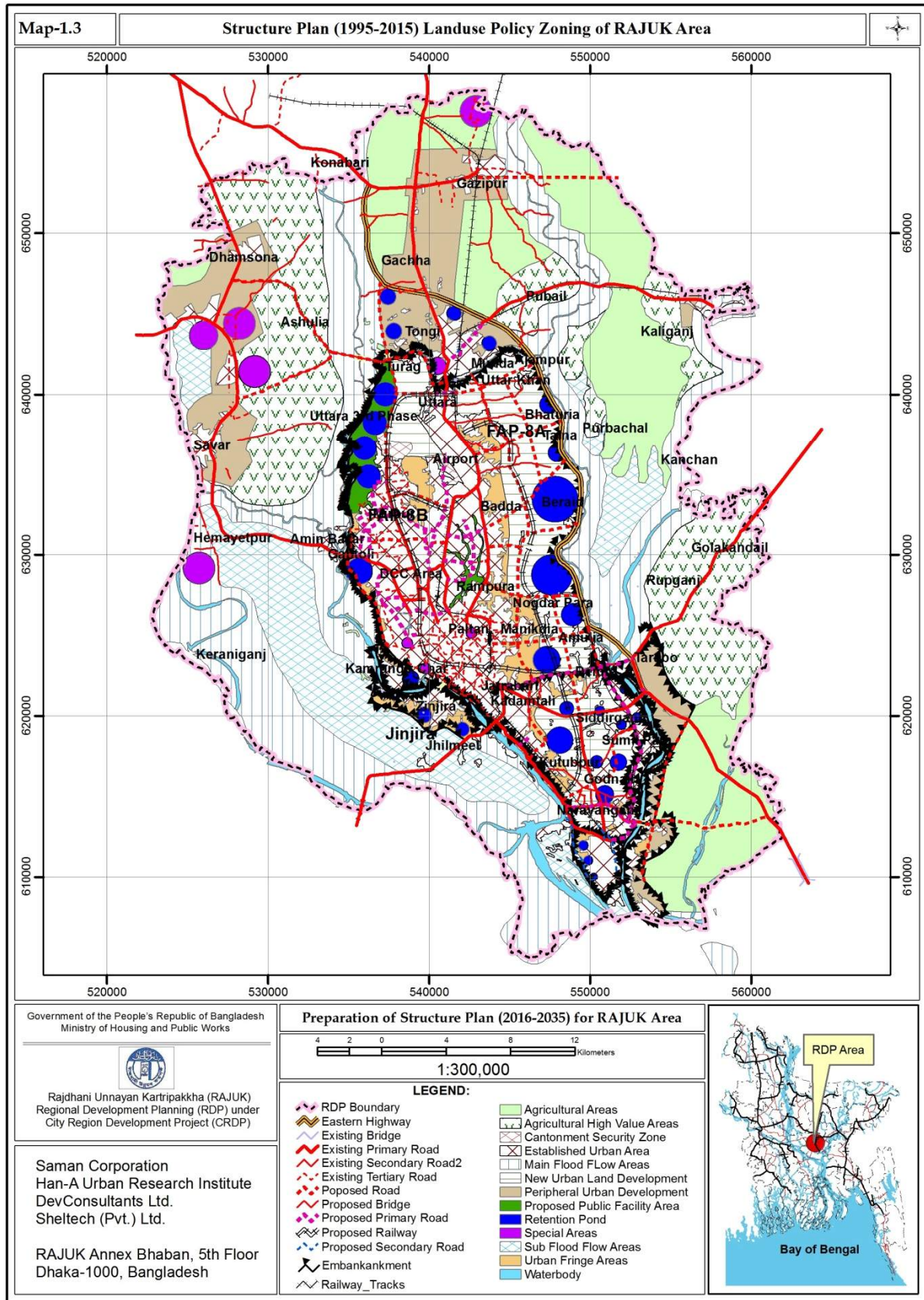
- Road from Star Gate to Notre Dame College was developed.
- Multistoried car park at Motijheel began long ago but yet to be completed.
- Recommendations about the use of old airport space could not be implemented due to opposition of the army.
- Proposal about Begunbari Khal area has been lately materialized in a better way.
- Relocation of central jail is in the process, but use of the vacant space is not yet decided.
- Conversion of Buckland bundh into recreational area have not been implemented.
- Detail area plan for Kamrangir Char have been prepared but not implemented.
- Road on the western embankment has been built.
- Preservation of Kalyanpur retention pond could not be achieved.
- Retention pond on the western zone could not be implemented.
- DAP for entire RAJUK area prepared.
- Connection of Gulsha-1 and Progoti Sarani has made.
- Inland container port at Keraniganj could be suspended.
- Road on the abandoned railway track in Kadamrasul was built as Narsingdi-Madanganj Road.
- Proposed municipalities in DND area did not establish.
- Only one north-south road built in DND area as an alternative access to Narayanganj.
- Road from Dayaganj to Jurain was built.

A major reason for failure to implement proposals is that RAJUK has very limited capacity to influence other agencies about their share of implementation. Nor does it have capacity to procure huge capital from the government for project implementation. There is need for a more powerful body for successful implementation. DMDP proposed that a new apex planning organization should be established with sufficient power and authority.

The issues relating to transport were later dealt with by newly commissioned Dhaka Transport Coordination Authority (DTCA). Transport and urban planning are interrelated issues. But DTCA lacked urban planning components. As a result DTCA could contribute very little in ameliorating the critical city transport problems. It also failed to implement many of the structure plan policies and proposals. Later, Strategic Transport Plan was formulated by the government, which also has largely remained unimplemented.

c. Detailed Area Plan (DAP) 2010-2015

Detailed Area Plan (DAP) is the third tier of the three stage DMDP plan package. RAJUK took up detail area plan project in 2004 and completed in 2010, fifteen years (2010) after the preparation of the DMDP. The DAP was prepared for the entire RAJUK area of 1528 sq. km, and not for selected SPZs as suggested in the structure plan. The Detailed Area Plan project area was divided into 5 groups and 11 locations on the basis of geographical location and settlement pattern.



The general objectives for the preparation of the Detailed Area Plan were envisaged as:

- Implement the Structure Plan and the Urban Area Plan policies
- Guide and control urban development in an orderly manner in preferred areas
- Create an urban environment where citizens enjoy the services that suit urban living

● **Review**

The major focus of the DAP was, first to put a control over free for all development within RAJUK area through land use zoning and second, to lay down the framework for development of future infrastructure and services. While the first objective has been partially achieved, the second focus has virtually been ignored.

DAP prepared a land use zoning plan together with infrastructure development plan. The land use plan indicated where future land uses have to be located, which is a part of development control. Any developer intending to develop any structure or make any use of any particular land has to obtain a land use clearance from RAJUK consistent with DAP. But developments have been observed in many places where land uses are being cropped up ignoring the land use zoning plan. In such cases, either the developer violates his approved permission or totally ignores RAJUK by not seeking any permission. RAJUK has limited manpower to look into all such cases of violation. In many such cases it simply ignores and overlooks, as these misdeeds are mostly done by the rich and the powerful.

Regarding infrastructure development no step has been taken to implement any of the DAP proposed infrastructure. This has hampered planned spatial growth of the city and deprives the new developers, particularly in the city fringe.

1.5.2 Review of Other Relevant Plans

a. DACCA Town Planning Report, 1917

During British colonial times the then famous Town Planner Sir Patrick Geddes was commissioned to make a development plan recommendation for Dhaka city. Geddes produced a proposal after a weeklong visit to the city. He mentioned the inadequacy of his own 'diagnostic survey' in Dhaka, because of the time constraint.

But he showed the way to deal with particular aspects of the city, and proposed that further surveys should be conducted in the same line to complete the process of diagnostic survey and subsequently to produce a more authentic master plan for the city. Geddes's emphasis was to conserve the indigenous character of the city while making plans to accommodate growth. Dhaka city was divided into zones in his plan, which offered an outline for development of the old town area with colonial offices and residential buildings around Ramna Green. But that plan was never adopted formally or no efforts were made for implementing it.

b. DACCA Master Plan, 1959

The first comprehensive master plan for Dhaka was prepared by a consortium of British firms Minoprio, Spensely & Macfarlane in 1958 under Colombo Plan of Commonwealth. The objective of this master plan was to establish planning principles rather than to lay down a detailed and inflexible scheme. It identified two main problems for the development of the city:

- Shortage of land above flood level on which to build and;
- The congestion in the old central area of Dhaka (Minoprio, Spensely & Macfarlane 1959)

The plan was prepared over a 20 year planning horizon (1958 to 1978) with an estimated population increase of 40% (1.75% per annum) during the period. The plan defined the land use pattern, zoning, water bodies, flood prone and buildable zones and proposed major infrastructure including road. It expected that population will increase from 575,000 to 816,000 in the main city and from 1,035,000 to 1,466,000 in the conurbations during the plan period.

In the Master Plan of Dhaka 1959, recommendations were made for residential, commercial, industrial and open space zoning. Also the recommendations were given in various sectors such as Transportation, Public Buildings, Education and Commerce, etc. The plan discouraged any extensive development in the old town, as it would involve displacing residential population for whom alternative accommodation would be difficult to find.

c. Dhaka Metropolitan Area Integrated Urban Development Project (DMAIUDP), 1981

The Dhaka Metropolitan Area Integrated Urban Development Project (DMAIUDP) was the first urban development strategic plan in Bangladesh. It was prepared between 1979-1981 with the financial assistance of the UNDP and ADB. The project was executed by the Planning Commission under the Ministry of Planning. The aim of the project was to prepare a long term development strategy for future Dhaka City with flood protection as the main focus. The most important policy issues dealt with in the DMAIUDP were economy, physical planning and socio-cultural aspects etc.

The project first drew up two concepts of future Dhaka city development. One was based on the idea of developing the city as an 'urban village' in cluster form. The idea emphasized on agricultural development as the mainstay of the economy with water transport as the primary means of transport. The second view was 'concentric peripheral growth' in compact form aiming at reducing travel distance and optimizing linkage between wide ranges of economic activities. This approach called for land reclamation in the fringe. The study team, however, later discarded both the concepts as impractical. DMAIUDP worked out nine options to future development of the Dhaka City.

However, DMAIUDP, like many other project reports, was shelved. The possible identified reasons for non-implementation of DMAIUDP are as follows:

- It was not a statutory plan like other RAJUK plans;
- It was undertaken by Planning Commission which is not empowered to execute a plan or policy;
- Its recommendations were not formally adopted as future Dhaka development policies by the highest body of the government.

CHAPTER 02
**DHAKA:
PAST AND PRESENT**



CHAPTER 02

DHAKA: PAST AND PRESENT

2.1 Dhaka's Story

Since its establishment, Dhaka has grown mostly without planning interventions; substantially organic in nature. The patterns of areal expansion and the urban form of Dhaka have been largely dominated by the physical configuration of the landscape in and around the city, particularly the river system and the height of land in relation to flood level. [Islam, 1996: 191]¹.

There are two dominant general patterns in the historical evolution of urban Dhaka (Nilufar, 2010)²: old Dhaka or the historic core, and new Dhaka or Northern expansion. The latter is actually post-colonial development, an effect of modernization, still spontaneous and organic in the pattern. Besides these two dominant factors, five distinct and mutually exclusive spatial patterns are found simultaneously existing in an explicit composition.

Dhaka reached its present status through a series of dynamic changes it underwent during different phases of history. The phases and consequent changes over the years have shaped Dhaka to its present structure.

The growth of Dhaka from 1949 to 1989 largely followed the limits determined by the Mughals (i.e. towards north up to Tongi, up to Mirpur in north-west, up to Postagola in south-east). The growth of modern Dhaka reached its apex just after the liberation war. The growth caused many low lands to be filled up caused by scarcity of land consequent rise in its price and all the low lying areas on the eastern and western side came under occupation. In the course of time, land use pattern was modified, and business activities were dispersed from Gulistan to a number of business streets. Although the major commercial buildings were still (in the 1980s) concentrated in the Motijheel area, the activities of CBD also became diffused.

The land use map of 1995 shows that new pockets of government institutions and commercial use have extended from Motijheel towards the northern area, e.g. Karwan Bazaar, Agargoan, Mahakhali, Banani and Sher-E-Bangla Nagar area. After the liberation of Bangladesh, a new CBD developed which was centered on Bijoy Nagar, the D.I.T Extension Road and Toynbee Circular Road. A second CBD emerged in the New Market and its surrounding areas, and all the highly integrated lines were within this newer part of Dhaka.

¹*ibid*

²Nilufar, F (2010) "Urban Morphology of Dhaka City: Spatial Dynamics of Growing City and the Urban Core" in *400 years of capital Dhaka and beyond* Eds. Hafiz, R and Rabbani, AKM G. Pp 187-210. Asiatic Society Bangladesh

Table 2.1: Historical Evolution of Urban Development of Dhaka (Nilufar, 2010)

General Historical Pattern of Dhaka	Distinct and Mutually Exclusive Pattern
Old or historic Dhaka City	<ul style="list-style-type: none"> Indigenous historical core e.g. Shankhari bazaar, Tanti bazaar, Sadarghat
New Dhaka or Northern expansion	<ul style="list-style-type: none"> Colonial interventions or civil lines, e.g. Minto road, Hare road, Bailey road
	<ul style="list-style-type: none"> New indigenous communities with mostly unplanned settlements, e.g. Kalabagan, Kathalagan, Razabazar etc. Planned scheme of new communities, e.g. Dhanmondi, Gulshan,
In both general pattern	<ul style="list-style-type: none"> Informal settlements or squatters, e.g. various 'bastees'

2.2 Contextual Analysis of Urban Dynamics

Dhaka, the capital of Bangladesh, well known as city of fine muslin, mosques and rickshaws, has a fairly long history of evolution (Taifoor, 1956:43). Dhaka, with the passage of time, testifies different faces of history. Now-a-days Dhaka is the most densely populated and rapidly growing city in the third world. Like many other cities in the world, modern Dhaka is also the outcome of spontaneous rapid growth without having any prior or systematic planning. As the growth of population in Dhaka is taking place at an exceptionally high rate, it has become one of the most populous Mega Cities in the world.

Historically, the political-spatial development process of Bangladesh has passed through passive and active stages followed by cooperation and accommodations as well as hostile situations. The legacy of spatial development in Bangladesh has led to the development of a few cities - particularly the capital city of Dhaka. The failure of planning initiatives is directly linked with the urban mismanagement and increasing inequality and poverty in the city of Dhaka during and after the period of independence of Bangladesh.

2.2.1 Urbanization Trend of Dhaka

Dhaka's urban population is growing at an estimated 4 per cent each year since Independence, at a time when national population growth was at 2.2 per cent (World Bank: 2007). This phenomenal growth is partly driven by the reclassification of rural areas into urban areas and natural urban population growth but also partly by considerable rural to urban migration. That large rural-urban population flows have been the key driver of the process of Urbanization of Dhaka city. A recent study by PPRC found that just 21 per cent of urban residents were born in the city they reside in and this figure has dropped to 16 per cent for Dhaka residents. The study found that pull factors such as employment and education opportunities were the main reasons for the shift to urban areas.

The urbanization of Bangladesh is interlinked with the intense development of Dhaka City. The historical process of urban development in Dhaka City presents different trends based on its political development. Dhaka developed as a politico-administrative city and subsequently economic and commercial activities have also concentrated in the city making it the prominent city of the country. The urbanization activities in Dhaka City have been achieving tremendous growth for the needs of the newly independent country's capital. Overall, Dhaka City has experienced its highest rate of physical and population growth in recent decades that transformed it into a megacity.

Dhaka alone contains 37% of total national urban population, conforming to the classic case of

primate city in which the population of the largest city is more than the combined total of the three next largest cities. Dhaka's inexorable growth as a primate city is mirrored in the extreme centralization of decision making and political authority. It is moot point as to whether a more vigorous policy choice towards decentralization might have resulted in a greater spatial balance of urbanization even with Dhaka continuing to be the leading city.

2.2.2 The Consequences of Rapid Urbanization of Dhaka

Urbanization worldwide has been found to be an effective engine of economic growth and socio-cultural development. In pure economic terms, urbanization contributes significantly to the national economy. Bangladesh (with less than 28 percent of population being urban) urban sector contributed more than 60 percent of the GDP in 2009 (Choe and Roberts, 2011, p. 120). This was only 25 percent in 1972-73. This obviously may lead one to conclude that urbanization on a macro-scale would be beneficial to the economy of Bangladesh. Urbanization also causes social development in terms of higher literacy rates, improvement in the quality of education and better health indicators.

Just as urbanization brings along economic and social benefits, it also has some negative effects, especially when it takes place at a pace as rapid as in Dhaka. Rapid urban growth has made heavy demands on urban utilities and services like electricity, gas, water, sanitation, sewerage, garbage disposal, transport, telephone, cables; and social services like health and education, etc. In each of these sectors, scarcity or inadequacy of the service and mismanagement in general has caused crisis situations.

The worst negative consequence of rapid urbanization on a massive scale within a city is in the form of degradation of the urban environment, of the kind which is now experienced in Dhaka. Its air, water and soil have been polluted to dangerous levels. Although, due to governmental and non-governmental interventions, the incidence of poverty has come down significantly in urban areas since liberation, it still remains pretty high at nearly 40 percent (although the recent official data shows it at only 26 percent in 2010). Most of these poor people are unable to afford habitable housing or other socioeconomic services. The immediate consequence of this is the growth of unhygienic slums and squatter settlements.

2.2.3 Age and Sex Composition

The distribution of household population in the RDP area by five-year age groups and sex is shown in **Table-2.1**. It shows that the percentages of population, irrespective of gender dimension, is 8.9% in infant age group (0-4 years), 10.1% in primary school children age group (5-9 years), 9.9% in high/junior high school children age group (10-14 years), 9.8% in youths age group (15-19 years), 12.3% is of age 20-24 years; 12.2% is of age 25-29 years, 25.9% is of age 30-49 years, 5.5% is of age 50-59 years, 2% is of age 60-64 years and 3.2% in old age group (60 years and above).

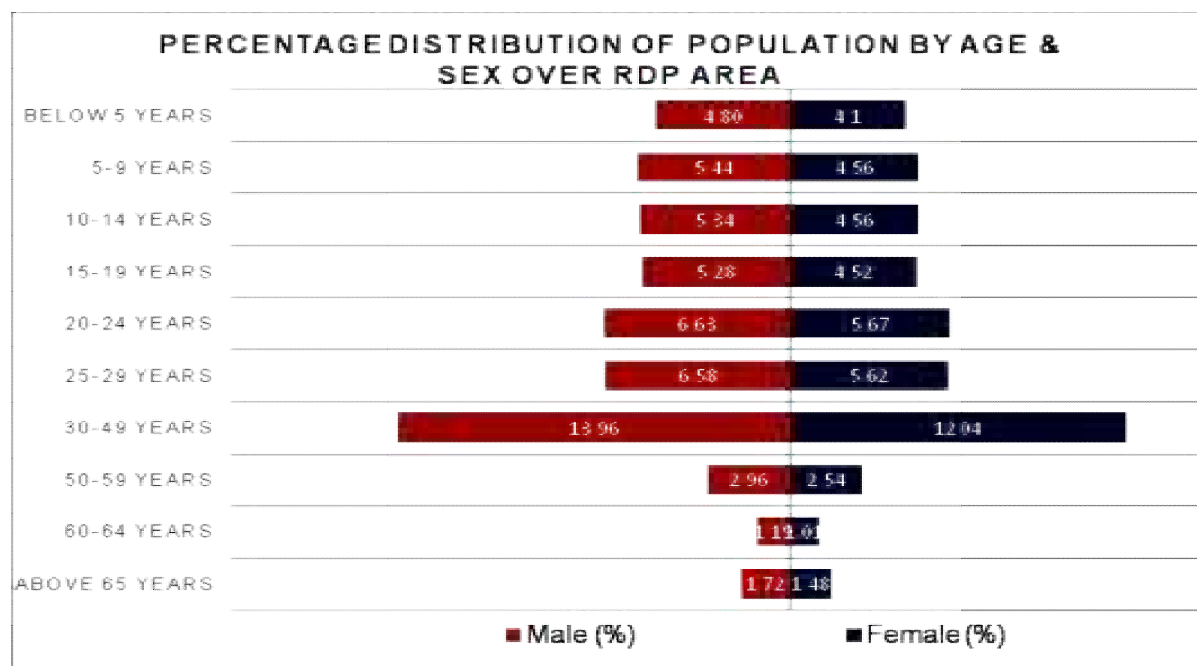


Figure 2.1: Population by Age and Sex over RDP Area

2.2.4 Migration

Rural-urban migration is a multi-causal phenomenon. It is usually compounded by environmental, social, economic, political and other factors. For the millions of rural poor in Bangladesh, Dhaka is still the most attractive destination. Compared to any other place in the country Dhaka offers the best economic opportunities. It is the administrative headquarters of the nation and the main source of civil employment, principal centre of financial and banking services; it offers the best health and educational facilities in the country. International commerce and business are all largely concentrated in Dhaka (Islam, 1999). More than 80 percent of the garment industries of the country are also located here. With these industries a large number of young females come to Dhaka. Migrants in Dhaka predominantly come from the Northern and Southern parts of the country. Comilla, Sherpur and Barisal are the top three districts from where most of the migrants come (Ishtiaque and Mahmud, 2011).

Population growth in Dhaka city during the period 2001 - 2011 was 3.96% per annum. During this period natural increase/ natural growth rate was 1.47% and migration rate was (3.96% - 1.47%) 2.49% per annum. So up to now, about 63% of the total growth of Dhaka's population is due to migration and only 37% of the growth is due to natural increase. From 1961 to 2001, in each of the four decades, about 73%, 77%, 73% and 57% respectively of the total growth of population have been due to in-migration. In recent times, because of climatic disruption, things have taken a very severe turn. River erosion victims from Rangpur, Gaibandha, Nilphamari, and Aila and Sidr-affected people from Barisal, Barguna, Patuakhali, Bagerhat and Satkhira, are coming to Dhaka for earning their living. Many of them live in makeshift slums in different locations of the city.

2.2.5 Slums and Squatters

Thousands of people are migrating to the already crowded Dhaka city every year from rural areas in search of employment and a better life. Most of these people are day laborers who live in some 4,500 unauthorized slums which are mostly controlled by political party cadres. Currently, about one third of the people in Dhaka live in slums and squatter settlements and this number is increasing with the increased number of migrants.

Table-2.2: Population and In-Migration Trend in Dhaka City from 1941 to 2011

Year	Population	Growth Rate in Dhaka City (% per year)	National Growth Rate (% per year)	In-Migration Rate (% per year)	Growth Due to In-Migration (in %)	Growth Due to Natural Increase (%)
1941	2,39,728	4.14	-	-	-	-
1951	4,11,279	1.28	-	-	-	-
1961	7,18,766	5.18	-	-	-	-
1974	20,68,353	9.32	2.5	6.62	73	27
1981	34,40,147	9.94	2.32	7.62	77	23
1991	71,24,730	7.55	2.01	5.54	73	27
2001	1,02,53,992	3.71	1.58	2.13	57	43
2011	1,51,23,293	3.96	1.47	2.49	63	37

Source: Bangladesh Bureau of Statistics, Bangladesh National Population Census Report - 1974 (Dhaka: Ministry of Planning, 1977); Bangladesh Population Census 1981 & 1991 Urban Area Report (Dhaka: Ministry of Planning, 1997); Population Census 2001 & 2011.

2.2.6 Informal Economy

Despite growth of formal sector industrial and other employment, Dhaka is dominated by the presence of a huge informal sector economic activities. A large number of people migrated to the city in past decades seeking employment opportunities. The migration to Dhaka from other parts of the country is taking place at a rate of 6.0 per cent a year. It has been estimated that about 65% of all employment in the city is in the informal sector (World Bank, 1999). Work in the informal sector has a potential role in influencing further rural-urban migration also.

2.3 Critical Issues

2.3.1 Very High Growth Rate

Very high growth of population has occurred in the RDP area during the past 20 years. DMDP growth estimates were 4% and 2.75% for the periods 1991-2001 and 2001-2011 respectively. While the actual growths were 3.71% (lower than estimated) and 3.96% (much higher) for the same periods. While the estimates were for decreasing rates of growth, the rate actually increased in the later stages, mainly due to migration. The implications for this trend are immense. Firstly, the rate actually went back up instead of declining, as anticipated. This grossly challenges the assumption of a declining growth with saturation in buildable land and other available infrastructure and resources over the entire area. Secondly, if the growth rate remains in these ranges somewhere, the kind of scenario it presents for a long-term period, say 20 years, is alarming indeed. Whether this staggering size of population would be manageable remains a question, let alone the issues of resource constraint and livability.

2.3.2 Extremely Rapid Peri-Urban Expansion

Explosive growth of population has occurred outside of defined urban local government boundaries i.e. peri-urban areas. Highest growths have occurred in Western region (Savar) @9.26%pa and Northern region (Gazipur) @7.43%pa between 2001 & 2011. Even if we look further into the scenario, the highest rates within these regions are outside of the urban local government jurisdiction, therefore, posing a great challenge for proper growth management, as these areas are the least equipped with regard to any kind of urban planning, management & service provision.

2.3.3 Wet-lands' Encroachment

The result of excessive development pressure means that almost any land would be lucrative for physical development and construction because there would be demand for it. While it opens the opportunity of flourishing urban development and construction/real estate sector, it has been threatening the existence of environmentally sensitive areas. Because of the weak control mechanism or 'police power' of the institutions to prevent encroachment into those areas, there has to be a stake for those areas at least as powerful or more to counter the open market forces.

2.3.4 Working with Informality

Dhaka is basically an 'informal city'. Most of the population of the area lives in informal settlements (in excess of 40%). Moreover, more than 80% of labour is involved in informal sector. These two combined pose the question whether strict zoning & other 'conventional' control mechanisms would be effective in these areas and whether inhabitants will be able to comply with them. On the other hand, if they are implemented strictly, the question would remain whether those people would be able to live there at all. For one of the least developed countries like ours, these issues demand careful consideration.

2.3.5 Lack of Essential Urban Spaces

Roads and railways, considered as the most important infrastructure in a modern city, constitute only a small portion of the total RAJUK area and even so in the Dhaka city. Considering the road area ratio of minimum 15% is a conventional norm for efficient circulation management in most of the modern metropolises, it is indeed a serious aspect of current land use in Dhaka. Parks and open space also comprises less than 1.0% of the total area. Many modern metropolises around the world nowadays boast green and open spaces of 20~30% of the total land area. For the comfort and health of the citizens of this mega city, Dhaka should indeed give extra efforts in securing and providing sufficient parks and open space.

2.3.6 Jurisdiction and Area Coverage of Institutions

Still the majority of the RDP area is under the jurisdiction of local governments that are originally constituted for rural areas i.e. Union Parishad. Now, whether it is keeping up with service and infrastructure delivery for the rapidly expanding areas or putting some kind of planning and development management mechanism in place, the decision has to be made regarding the fate of these areas. As has been usually the case, development concentration has mainly followed infrastructure layout (specifically major road alignments). Will the areas then, to be covered by planned infrastructure, come under some urban Local Government before the infrastructure is laid out? Answering this question is critical because it will determine the fate of the urban management structure for the planning area in the foreseeable future.



CHAPTER 03
**FUTURE
GROWTH
DIRECTION**

3.1.2 Operational Framework

The current plan is designed to review the previous structure plan and update it with a vision for the city up to the year 2035. This section intends to put the scope and content of not only the structure plan but also the further detailed level plan for Dhaka so that the overall structure is revealed. The purpose is to capture how the issues regarding urban development would be covered under different levels of plans.

Table 3.1: Character and coverage of different levels of plans for Dhaka

Structure Plan	Metro Region/ RAJUK area	Scope	Input
		<ul style="list-style-type: none"> - Interpretation of higher level policies - Broad Development Direction - Integration of programs and investments major sectors - Implementation mechanism - Framework for local level plans 	<ul style="list-style-type: none"> - National policy - Major sector policies & regulations - Broad vision for the region - Population dynamics - Natural/environmental traits - National & regional economic trends
		Output	Institutional Arrangement
		<ul style="list-style-type: none"> - Urban growth management strategy - Broad land use zoning - Long term Transportation strategy - Infrastructure guidelines - Environmental protection/ conservation strategy - Investment strategy - Institutional arrangement & division of responsibility 	Led by RAJUK involving all concerned stakeholders especially all Local Government units within its territory
Detailed Area Plan	Smaller planning zones within Structure Plan boundary	Scope	Input
		<ul style="list-style-type: none"> - Interpretation of structure plan policies - Development decisions consistent with higher plans - Land Use zoning - Basis for development permit - Local development projects 	<ul style="list-style-type: none"> - Structure plan policies for the area - Local aspirations & needs - Land use pattern - Critical local concerns - Local economic traits & opportunities
		Output	Institutional Arrangement
		<ul style="list-style-type: none"> - Detailed Land use - Development control tools & regulations - Detailed development standards - Service & infrastructure plans - Local project design - Implementation phasing & timeline 	Partnership of RAJUK and the concerned Local Government body for each particular planning area; technical support provided by RAJUK

3.2 Population Growth and Distribution

Dhaka Metro Region has experienced phenomenal growth since the independence of the country. Though the national, urban and Dhaka population have been growing with declining rates, Dhaka metro went through an upward curve during the later half of the last inter-census period of 2001-2011. The observation of this study reveals a sharp increase in in-migration during this time after 2005.

The DMDP estimated net rural to urban migration to be 25% of the total natural increase of the rural areas for a particular period, and Metropolitan Dhaka to absorb 40% of those migrants. Taking data estimates from year 2000 (base year for population projection for this study) up to 2010 show an increase in both these parameters. This study estimates around 40% migration out of the total rural natural increase while Dhaka shows to have attracted in excess of 50% of those migrants. For both the figures, the proportion is higher in post 2005 period though. Ignoring this unusual hike, the long term forecast estimates a flat 40% net rural to urban migration from 2015 onwards while a gradual decline in Dhaka's share to an eventual 50% of the total migrants in 2035. As usual, net international migration is assumed to be nil.

Table-3.2: Population Growth Scenario from Base Year 2000 to 2035 (figures in millions)

Year	Pop from NI	In-migrant & its NI (Cumulative)	Total Pop.	Total Increase	Cumulative Increase	Share of NI %	Growth Rate %
2000	10.28		10.28				
2005	10.92	1.42	12.34	2.06	2.06	30.78	3.72
2010	11.53	3.20	14.73	2.38	4.44	25.72	3.60
2015	12.13	5.19	17.32	2.59	7.04	23.09	3.30
2020	12.74	7.09	19.83	2.51	9.54	24.14	2.74
2025	13.33	8.88	22.21	2.38	11.92	24.86	2.30
2030	13.85	10.37	24.22	2.01	13.93	26.09	1.75
2035	14.30	11.64	25.94	1.72	15.66	26.24	1.38

Source: Total population up to 2010 from UN estimates. Notes: NI= Natural Increase; NI rates for both base population and migrants assumed as same, interpolated from UN national NI rates projection;

According to estimates, 2010 to '15 period experiences the highest total increase. This growth stables up to the period 2020 and gradually starts declining. The post 2020 trends basically correspond to the overall national growth forecast. As the national population growth goes through a smooth declining curve, expected net migration to urban areas follows the trend. At the same time, the natural increase rate also dwindles according to estimates. Only natural increase would have taken the base population of Metro Dhaka of 10.28millions in 2000 to 14.30millions in 2035, an increase of 4.02millions. As has been the case, net migration and their own natural increase together constitutes the overwhelming majority of the total growth, 11.64mil. up to 2035. This is around three quarters of the total growth of Dhaka's population in the 35 year period.

**Table-3.3: Projected Spatial Distribution of Population & its Share among Six Regions
(figures in millions)**

Components	Year	Central	Northern	Eastern	Southern	South-western	Western	Total
Total Pop.	2000	6.502	0.796	0.468	1.381	0.605	0.532	10.28
	2005	7.510	1.141	0.530	1.630	0.687	0.844	12.34
	2010	8.610	1.583	0.595	1.914	0.774	1.252	14.73
	2015	9.756	2.087	0.662	2.218	0.866	1.730	17.32
	2020	10.834	2.599	0.729	2.497	0.952	2.214	19.82
	2025	11.756	3.109	0.829	2.755	1.063	2.694	22.21
	2030	12.461	3.551	0.948	2.965	1.181	3.110	24.22
	2035	13.046	3.910	1.081	3.153	1.305	3.444	25.94
Share of Pop. %	2000	63.22	7.74	4.55	13.42	5.88	5.17	100.00
	2005	60.85	9.25	4.29	13.21	5.57	6.84	100.00
	2010	58.46	10.75	4.04	13.00	5.26	8.50	100.00
	2015	56.34	12.05	3.82	12.81	5.00	9.99	100.00
	2020	54.65	13.11	3.68	12.59	4.80	11.17	100.00
	2025	52.94	14.00	3.74	12.41	4.79	12.13	100.00
	2030	51.46	14.66	3.92	12.24	4.88	12.84	100.00
	2035	50.29	15.07	4.17	12.16	5.03	13.28	100.00

Source: Total population up to 2010 from UN estimates. Notes: Share of population of 2000, 2010 taken from BBS2001 & 2011 respectively, interpolated for 2005. Population of 2005 calculated from interpolated share.

The distribution of people in the metropolitan is dominated, quite naturally, by the central region containing the core city of Dhaka. Its decline in share is evident though from historical data. This trend is estimated to carry on. The scenario reflects an overall fall in migration pattern, especially in the later period, and also areas approaching saturation. But more importantly, it is a resultant phenomenon of the much faster growth rates in the outlying regions. Although these regions also reflect the overall trend to a certain extent, their base growth rates are faster to begin with than that of the central region.

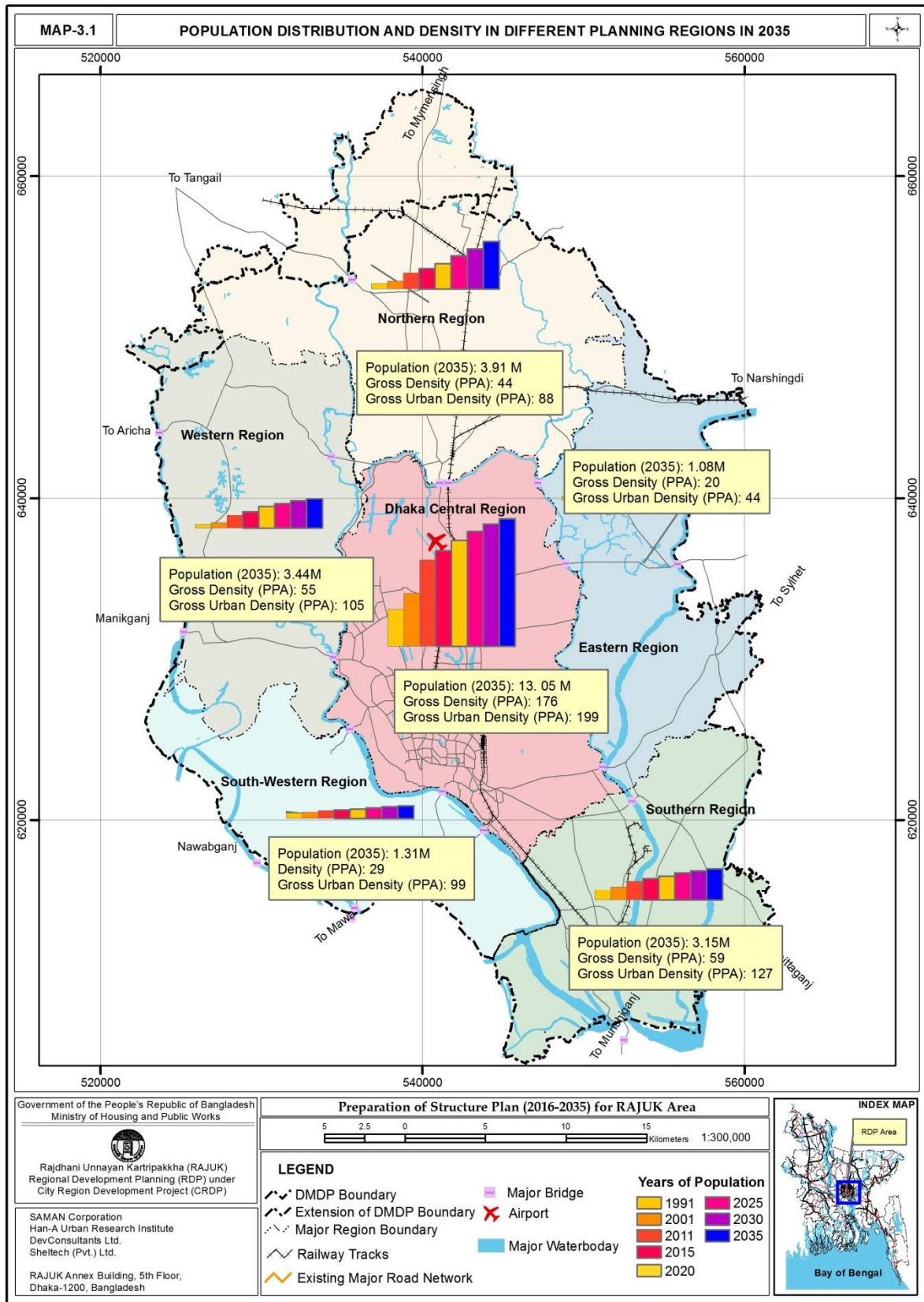
The change in the number and share of population reveals a general direction of future growth. While the overall base population of the metropolitan in 2000 doubles in just over 20 years that of the central region doubles in 35 years with a much slower growth rate. In contrast, in that same 35 years, the base populations of the northern and western regions are estimated to grow five times and around seven times respectively, at excessively high growth rates.

In the future projection, the current trends have been assumed to continue somewhat up to 2020. A few factors have been considered to be pivotal around this time to assert influence on the growth pattern onwards:

- Mass transits like BRT and metro systems coming into operation loosening the necessity of centrality
- Growth beginning to take off in new settlements like Purbachal, Jhilmeel etc. after the initial slow gestation period
- The opening of the Padma Bridge inducing growth in the southern part
- Relocation of key employment like that in RMG sector from the older established parts of the core city lessening the strength of these areas to pull migrants
- Higher levels of mobility along with more choices of location for living resulting in internal migration within the metropolitan from the central to the outer regions

The resulting estimation therefore shows a sharp rise in the inflow of migrants in both the eastern and south-western regions after 2020. While the northern and western regions continue to expand their share of in-migrants gradually, the absolute numbers fall reflecting the overall scenario.

Eventually, the share of the central part falls off to half of the total population of the metropolitan. Despite the very high growth rates of the outer regions, the central region stills holds majority of population. This is because its share was overwhelming to begin with; five times of the then second largest southern region in terms of population. The core city, obviously, is expected to retain its prominence with its very high levels of goods and services. The strategy, therefore, prescribes not the limiting of the core part, which is experiencing proportionate diminishment anyway. The focus would rather be on accommodating the expected rapid growth of the outlying regions in a planned and coordinated manner within the plan period.



3.3 Spatial Growth Strategy

3.3.1 Context for the Strategy

One of the strategic options considered by DMDP was in fact sub-regional dispersal. But the term 'region' used here was more from a national scale than metropolitan scale. The possible centres for dispersal therefore included places like Sripur, Narsingdi, Kaliakair which still are more than two hours' journey from the city. This option was ruled out.

Another influential option was the 'Northern Expansion' of the city towards Tongi and Gazipur. Elements of the strategy were adopted as long-term growth option during the last quarter of the plan period. Although the supporting study pointed out many positive features of this option, it was considered as too dramatic and immediate to be considered in the short to medium range. It was entertained though as a long range possibility.

Likewise, the emphasis ultimately was on further densification of the existing built up area and accelerating growth in the fringe areas. As long term strategies, that is after the mid-point in 2005, new land development through the means of flood protection and transport development, and dispersed developments in relatively flood free lands in Savar-Dhamsona and Tongi-Gazipur were proposed.

The DMDP Structure Plan explains, in the concluding part of the section on urban area policies, the conditions where this kind of developments could be appropriate: "Sustainable, large-scale dispersal within the capital region can only be achieved by a long-term Government commitment to establishing an effective metropolitan transport system, with emphasis on mass-transit, and policies founded on a variety of inducements and controls aimed at modifying the existing spatial pattern of economic activity."

The development of the first aspect – effective transport system with mass-transit – began with the initiation of the Strategic Transport Plan (STP) for Dhaka. Although the implementation of the policies is delayed, the proposals for fast-moving, bulk passenger carrying transits of BRT and Metro have started coming into place already.

The spatial pattern of economic activity – the second aspect described in the DMDP for effective large-scale dispersal – interestingly, started shifting somewhat even earlier. Garment still is the largest employer in the formal sector (49%). A recent finding shows that the 'peri-urban areas of metropolitan Dhaka have emerged as competitive garment production centres'. It indicates an outward movement of industrial activities from the city centre. Even the recent trends in the population growth and its spatial distribution can easily point to the places where the agglomeration has been happening. The explosive growth in the outskirts described earlier in the chapter can also be correlated with the actual employment locations.

The current strategy can be said to be somewhat of an extension and a more elaborate manifestation of the 'Northern Expansion' strategy but in many other directions in addition to the northward expansion. The over-congestion of the core city along with the recent developments described above also calls for imminent action for redistribution of activities for a more balanced metropolitan region. It is in the backdrop of this context that the proposed strategy has been formulated.

3.3.2 Basic Principle

The main theme of the proposed concept is to create decentralized concentration i.e. diffusing the major functions performed by the core city and redistributing it to different urban centres within the regional boundary of RAJUK. This will help create a hierarchical framework of different magnitudes of urban centres providing corresponding levels of services and employment opportunities.

Main components of the concept are:

- Changing urban structure
- Reducing trip generation and traffic
- Enhancing local accessibility

The topmost framework of the spatial strategy is the classification of the planning area into six major regions, each with an existing or potentially dominant urban place as its center: Narayanganj, Savar, Gazipur, Purbachal, etc. Then within the regions, there would be urban areas, both established and developing in nature. The particular functional centres to be proposed are to be located within these urban areas. These ideas are elaborated in the next subsection.

Definition of Some Essential Terms:

Region: Regions are the large functional areas within the Metropolitan almost like a city by themselves with a central focal point of urban agglomeration. Six such regions have proposed in the Metro under this plan.

Centre: A centre is place where varying concentrations and combinations of retail, commercial, civic, cultural and residential uses are focused around transport facilities.

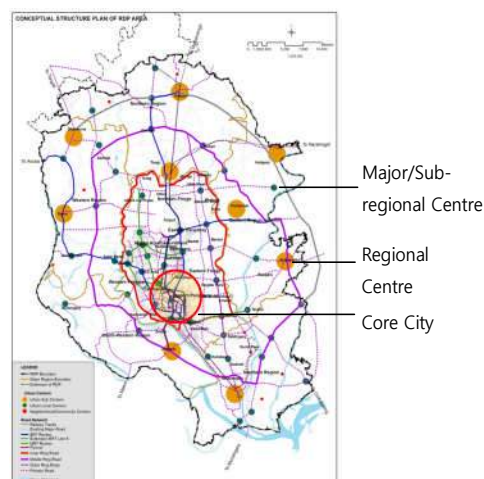
3.3.3 Major Features

a. Decentralizing Urban Functions and Services

Planning and redistributing major functions of core city to other secondary centres within the region is deemed to release the pressure currently experienced by the core city. The aim is to use the existing urban footprint and infrastructure in those centres. On one hand, this would free up over densification of the core, on the other hand, relocation of urban services means availability of those services nearer to living places. In line with this strategy, it is also suggested **to promote future new developments on the North-Eastern direction** towards Purbachal and beyond. East or Northeast of Dhaka city core is relatively under developed despite its close proximity to the existing built-up areas. From the point of overall structure, it is justifiable to consider future developments toward this direction with completion of proper flood protection measures along the Balu River. Diversifying the growth axis other than the North and West, it is also crucial to link the already developed and proposed new towns in the East and North-East.

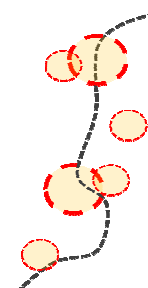
b. Making a Structured Network of Hierarchical Urban Places

Designating certain level of hierarchy of centres based on level of service & function will create a structured urban space system/pattern. For instance, a local/community centre would be providing basic daily needs and local level demands while the core, at the top of the hierarchy, would have very high level service supply that the city needs in addition to the services other lower tier centres provide.



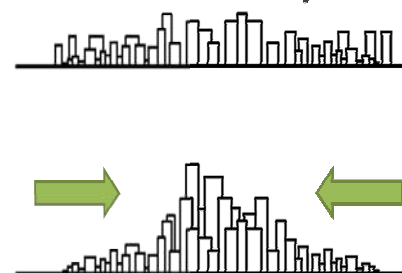
c. Integration of Spatial Development with Transport Corridors

Planning nodes of activity along or near major transport corridors is intended for high levels of accessibility. This means intentionally putting public uses closer to major transit or public transport routes. This would imply lesser traveling for different activities between centres, and also reduced trip length for in-centre activities.



d. Creating Opportunities for Compact Development by Focusing Activities in Centres

As already discussed, the essence of the basic concept is promotional in nature. Although there would be certain restrictive mechanisms in place to protect sensitive areas, it would be underpinned by incentives to develop close to centres, shifting the focus away from fringe area development.



3.3.4 Key Tools of the Strategy

There is basically a couple of tools to apply the proposed concept or spatial strategy on the field. The first one is to divide the whole planning area into six functional regions. The intention is to build self-sufficient areas that can provide both accommodation and work opportunities for their residents along with other basic urban services.

The second one is the ordering of the major focal points in urban settlement called 'centres' into a hierarchical framework. These centres could be in established, developing or potential urban areas. These focal points or points of activities are termed as centres, that would be intensely built and provide major public functions.

a. Functional Regions

In order to develop a planning policy framework to promote a sustainable Regional Development Plan for Dhaka Metro region an area of 1528 sq.km has been designated. The area is slightly larger than the DMDP area (existing RAJUK area). In DMDP area, the Kayaltia and Kashimpur unions of Gazipur upazila were partly included, and the Konabari union was totally excluded and also the Dhamsona union of Savar upazila was partly included; but now these unions have been fully included in order to make it easy to develop the desired planning policy framework.

The planning area has been divided into six regions by consideration and combination of some key characteristics:

- Major existing & potential urban centres, their location and immediate influence zones
- Existing administrative boundaries for demarcation of the boundaries of the Regions, political administrative boundaries of unions, upazilas and districts have been followed

Regions are the basic units of the functional decentralization that the core idea proposes e.g. diffusing/spreading urban functions to other regional urban centres. To begin with, each region has some special character that signifies its existing nature. Moreover, it also possesses some traits that point toward some future growth direction or function that holds high potential for that specific region. These two aspects combined would be the guiding force for determining the spatial development strategy of the regions.

The six regions devised for the planning area forms the functional basis for the spatial planning concept. On one hand, it is true that the city region has grown around and heavily dependent on the Dhaka city core. At the same time, it is also true that based on the urban centres surrounding Dhaka like Savar, Narayanganj, Gazipur etc. many small settlements have grown around each of them. Dhaka city, as part of its growth process, has gradually spread its influence zone engulfing surrounding urban centres, and forming an Extended Metropolitan Region (EMR) which is the basis of this plan making effort.

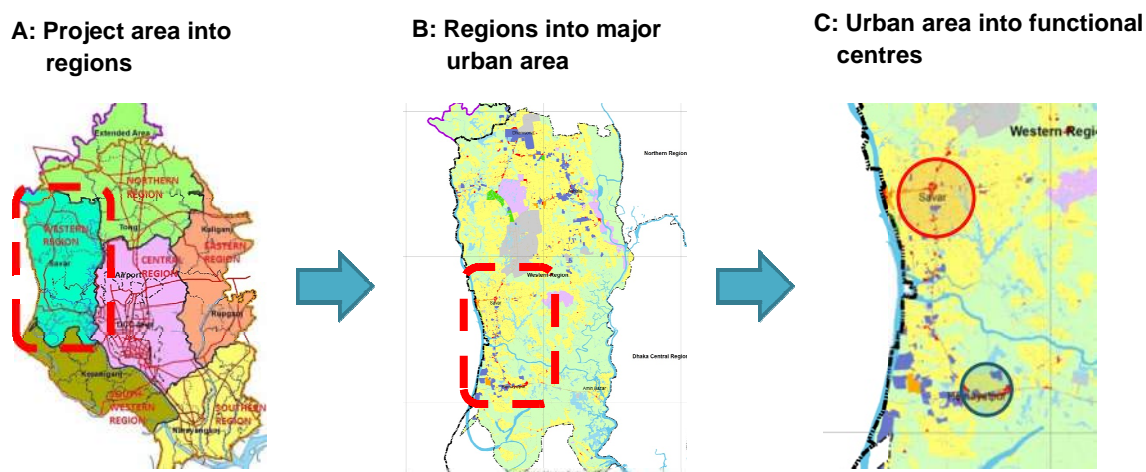


Figure 3.2: Space Hierarchy in the Spatial Planning & Development Strategy

As seen from the growth pattern, the central and southern regions, at least the present infrastructure, obviously are saturated. While the northern and western regions, Gazipur and Savar areas respectively, are growing way above the average growth rate of the entire region. Now as the majority of the growth in the current trend has been occurring outside of the core city anyway, the fundamental idea is to accommodate the growth in certain points in a compact way. The intention is to make maximum utilization of the existing infrastructure in those areas.

Table 3.4: Growth Scenario of the six regions

Region	Area (km ²)	Area (Acre)	Area (%)	Population			Growth Rate(%)		Density (ppa)			Change in Growth
				1991	2001	2011	1991-2001	2001-2011	1991	2001	2011	
Central	307	75,740	19%	4,296,643	6,482,877	8,841,105	4.20	3.15	57	86	117	-1.05
Northern	363	89,776	23%	531,977	794,075	1,625,768	4.09	7.43	6	9	18	3.34
Eastern	238	58,770	15%	383,412	467,013	610,799	1.99	2.72	7	8	10	0.73
Southern	278	68,721	17%	1,019,888	1,376,412	1,965,425	3.04	3.63	15	20	29	0.58
South Western	166	41,091	10%	530,174	603,114	794,360	1.30	2.79	13	15	19	1.50
Western	246	60,661	15%	362,636	530,501	1,285,836	3.88	9.26	6	9	21	5.38
Total	1,598	394,759	100	7,124,730	10,253,992	15,123,293	3.71	3.96	18	26	38	0.25

Source: Area from GIS calculations under this study, population data from BBS Census. Notes: Change in growth is the difference of growth rates between 2001-11 & 1991-2001

b. Poly-centric Structure

The division of the planning area into regions and major urban areas is followed by the identification of actual functional nodes within these urban areas. These are the intersections, transport hubs, critical points around which different public functions and urban services gather and grow. This framework is intended to set the basis for urban growth and service delivery for the city areas. Accumulation of the non-residential uses close to each other and to transport corridors is the underlying instrument that helps manifest this structure on ground.

This is basically a promotional approach where, realizing the benefits of agglomeration, there would be incentive/encouragement to locate activities within the centres. Concentrating a greater range of activities near one another in centres well served by public transport makes it easier for people to go about their daily activities and helps create lively, functional places in which to live, work, socialize and invest.

• What is a Centre?

A centre is a place where varying concentrations and combinations of retail, commercial, civic, cultural and residential uses are focused around transport facilities. Dominance of basically public uses and their concentration would constitute the major feature of these places. Usually these are major transport hubs and business/retail points. Although there would be major residential use within the centre, the essential functions would be shops/retail, office/employment, service facilities of different kinds, administrative functions, parks and open spaces, recreational facilities etc. The purpose is to provide effective focal points for development of infrastructure and services throughout the urban areas.

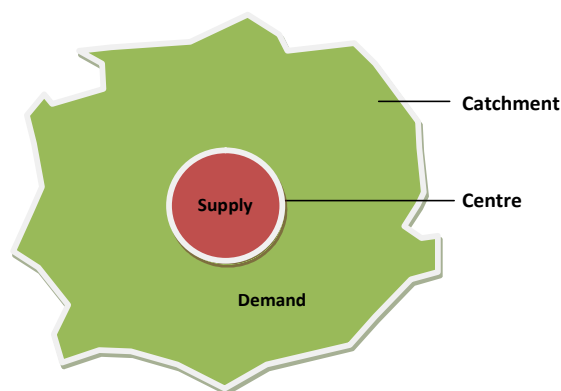


Figure 3.3: Centre and Catchment Relation

The figure intends to explain the idea of a centre from more of an economic point of view. If the core of a centre, as explained above, is the provider/supplier of various urban services, the catchment or influence zone is the recipient or consumer of those services. Of course, this would not be an all-or-nothing or exclusive relationship. This means that there might be many consumers within the core and also many small service providers within the catchment. The attribute is mainly based on dominant function type.

• Centre Type and Hierarchy

The structure of hierarchy of urban places created under the conceptual framework is a functional one. To begin with, the whole concept of city region of Dhaka has evolved with the assumption that the key services or functions performed by the core area have spread their influence to outer areas like Narayanganj, Gazipur, Savar etc. so as to form a functional relationship with these areas. In same line of reasoning, it is also true that many smaller areas have developed having a relationship with these outer urban areas which is similar to what these outer areas have with the core of Dhaka.

In this backdrop, the study has proposed a structured hierarchical relationship among urban places of various scales to make explicit their roles and facilitate the assignment of their particular functions. A detailed list of different levels of urban centres of the five outer regions with location and other features has been given in Annex 3.1.

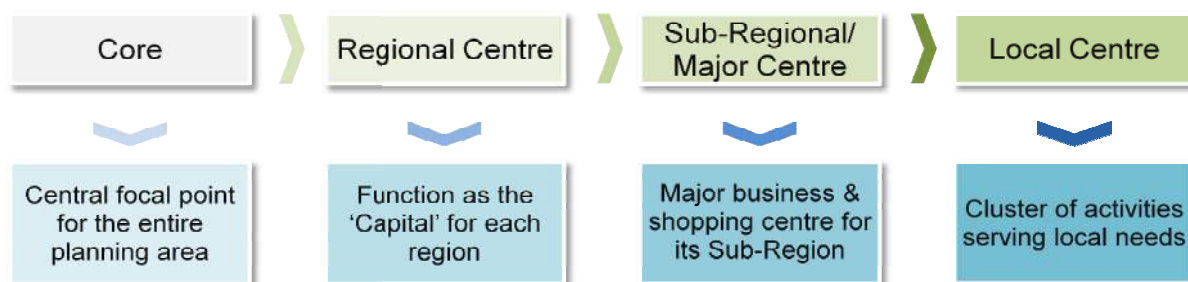


Figure 3.4: Different Magnitude of Centres & their Broad Roles

- **Core**

It is the centre of activities in the established main city having its service area in the whole metropolitan area. This is the place for high density, varied range of housing, sophisticated, high skill and highly paid knowledge-based jobs, full range of business and professional services, historic and landmark public spaces and sites and a destination for national and international art, culture & entertainment. It is mainly Dhaka City Corporation area of the central region. There is only one of its kind.

- **Regional Centre**

This is the main urban centre and functionally plays the role of 'capital' of each region. It is the focal point of development for a region and generally an urban administrative headquarters. Usually it offers a full range of services including government, health, education, housing, recreation and public space. This is also the most important economic centres regarding the strategy providing wide range of economic activities and employment. It is intended to offer such a range of opportunities as to make the region largely self-sufficient.

Coordinate functional sharing with CBD in response to enhance employment centres in RAJUK area and reduce commuting distance by strengthening the centrality of sub-centres. These are usually central focal points of different regions other than the central region, lower to the core in hierarchy.

- **Major/sub-regional Centre**

Major centre is the main retail, business and employment centre for its sub-region. It supports local employment and provides goods and services of a wide range to meet the local demand. It has high levels of health and education services to cater to the needs of the sub-region's demand. It also coordinates functional sharing with sub-centre over the boundary of union. Usually there are 4-5 major/sub-regional centres in a region; lower to the regional centre in hierarchy.

These are Intermediate centres between sub-centre and community centre

- area with development potential on the major development axis
- nodal point of public transportation e.g. multi-transit centres
- strategic areas as employment centre to reduce long-distance commuting.

- **Specialized Centre**

It is a concentration of economic activities and major employment which perform a vital role for the entire region. It is basically an employment destination providing work for a specialized sector e.g. research, university, particular type of manufacturing/service industry, health facilities etc. Although developed based on employment opportunities, this also contains housing and other essential services for people employed in those industries. These are important employment destinations e.g. Dhamsona, Tongi etc.

- **Local/Community centre**

Centre to support the convenience of residents; designated community centre with consideration of centrality, historicity, development potential, accessibility by transportation, regional balance of development, adjacency to other centres.

c. Function of the Centers

As discussed earlier, the differentiation of hierarchy pattern of the centres is basically functional. Putting it simply, the kind and level of activity carried out in each centre forms the foundation of the whole mechanism. For example, a basic daily need like grocery should be available in the local/community centre while if somebody needs a very high-end/sophisticated product or service, the core city or any specialized centre (in case of some specialized need) would be the place to go.

As this is a promotional/directive strategy, initiative would be required on the part of the authorities to induce the services that are considered essential for a certain level of urban centre. For instance, an area marked as a Major Centre might lack in some basic service of health/education deemed appropriate for that level. The authorities would have to facilitate establishment of such services within that centre. This is true for almost all the other centres except the core; because the core already attracts all kinds of services because of the very high density and diversified market base.

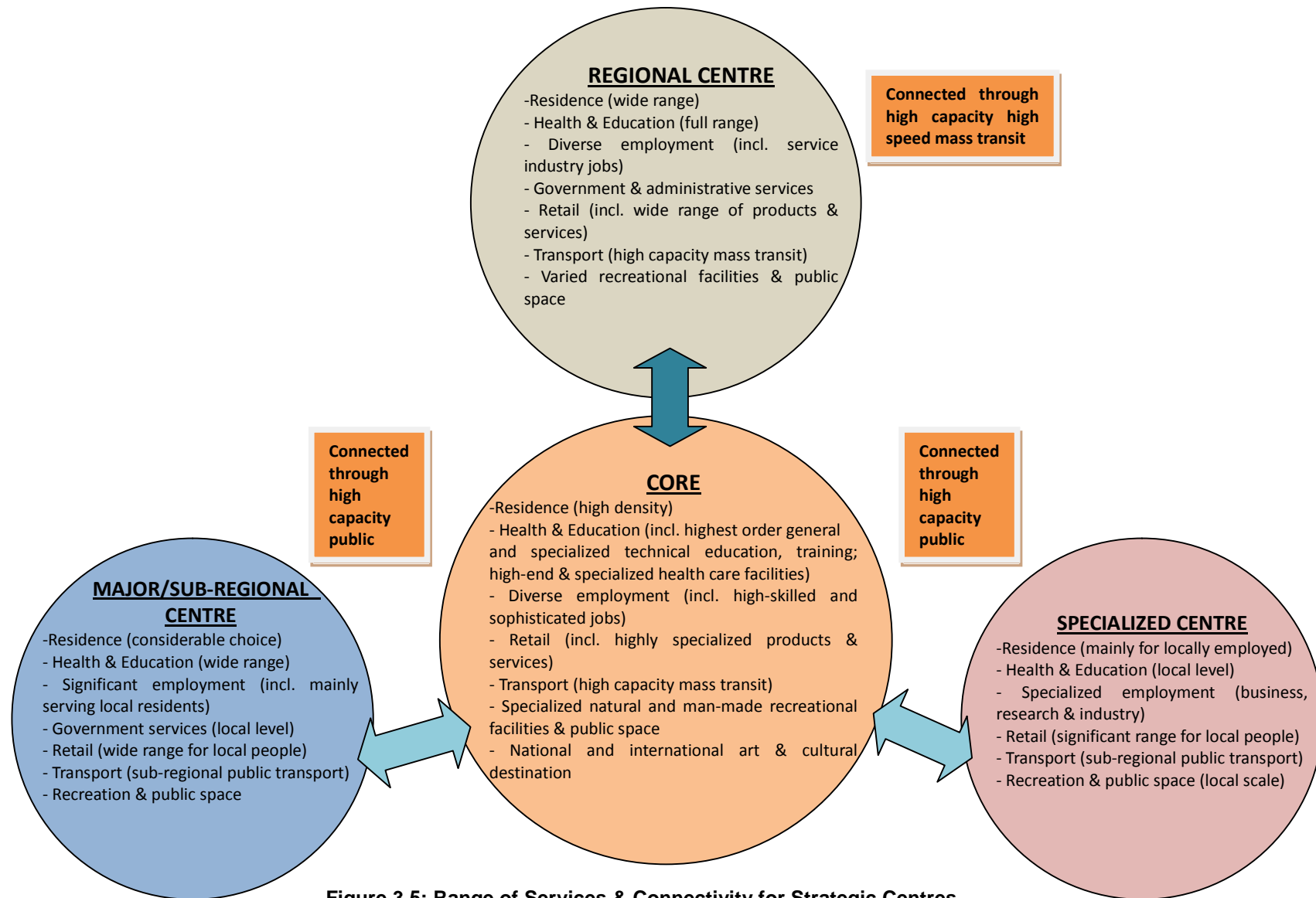


Figure 3.5: Range of Services & Connectivity for Strategic Centres

Box-3.1

Reinforcing a new North-eastern Spine

Dhaka is a land hungry city, developing fast devouring all the vacant lands within its inner parts. So far its growth trend has been elongated towards Tongi-Gazipur and Savar-Ashulia. Three main reasons driving the city towards northern corridor are, flood free high land, availability of transport corridor and the influence of manufacturing based employment centres. Elongated development has two main disadvantages. First, it increases cost of providing infrastructure and services, and second, it impedes balanced peripheral development. Eastern fringe of Dhaka from Demra to Purbachal spreading upto the Balu river is very close to the City. From Baridhara the distance of the Balu river is only 6 kilometers. Development in this area is handicapped as the area is flood prone and devoid of road infrastructure including connectivity with the main city.

Western fringe along the Turag river had a similar situation before development of the western embankment. As soon as western embankment was built rapid development took place in the western fringe. To accommodate huge future investment in housing and services sectors the eastern fringe can be put into effective use. Erection of embankment along the Balu river and preservation of canals and retention ponds within the area can substantially reduce flood vulnerability. Some environmentalists argue about the susceptibility of the area to liquefaction effect during an earthquake. In this age of technology, ways and means are there to mitigate liquefaction affect substantially. The problem of liquefaction can substantially be handled by undertaking mitigation measures, like, constructing liquefaction resistant structures, using stiff foundation mats and adopting soil improvement techniques. Geological Survey of Bangladesh (GSB) has recently prepared a map called **Engineering Geological Map for Dhaka Central Part** where it delineates the sub surface soil suitable for urban development. In this map the eastern fringe area has been described suitable for moderately good for light civil construction with proper foundation, but to be preceded by detailed geotechnical investigation. The study also shows that building ground of the site is vulnerable for high rise construction. Only light structures (<6 storied) with the foundation depth of 9-12 meters and heavy structure (>6 storied) with the foundation depth of 12-15 meters can take place in the area. Furthermore, it is strictly recommended for detailed sub surface geotechnical study before venturing into any kind of individual civil structure foundation and design. Please see **ANNEX 11.1**.

d. Walking Catchment of Centre

Walking catchment for a centre is its immediate surrounding zone of influence. It is the area from where people are supposed to avail the services offered in that centre like commercial, retail etc. by walking. This catchment is usually a buffer of a certain radius from a central point like a transit station. This radius varies among different centre types and gets longer for higher level centres. This strategic plan demarcates the extent of the walking catchments approximately as uniform shapes which are indicative. The actual extent of the catchments should be prepared at detailed local level plans considering local conditions.

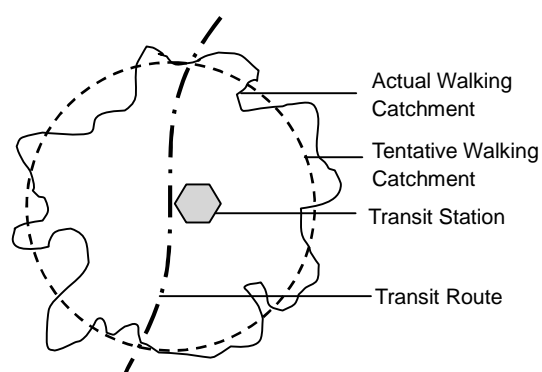


Figure 3.6: Walking Catchment of a Centre

3.3.5 Justification for the Concept

a. Reinforcing Power of the Current Trend of Locating Near Corridors

Public functions, particularly retail and other commercial activities, intend to stay as close to transport corridors as possible for their own benefit. In our weak governance scenario, seldom this powerful trend can be controlled by the authorities through development control measures. As a contrast, the principles of the proposed strategy attempts to accept and accommodate this force in a planned way rather than fighting and resisting it. It takes the natural tendency and uses it to its own advantage.

b. Enhanced Accessibility

Concentrating public activities from commercial and retail to institutional, health and recreation helps create an agglomeration effect. Concentrating different facilities in centres makes it easier for people to go about their daily activities as landing within the centre would mean having a lot of different services available within walking distance.

c. Reduced Transport Demand

The centres would also accommodate a wide variety of residences in addition to various public facilities. This means more homes close to employment and, therefore, less travel requirement. This is one means of reducing trips, particularly work trips. Another probable outcome, basically resulting from clustering activities, would be to reduce other-than-work-trips e.g. shopping trips by making diverse products and services available at roughly neighborhood or walkable scale.

d. Structured Urban Pattern

The proposed concept intends to create a spatial hierarchy, mainly based on function and scale. A particular pattern of urban structure can supposedly result in many benefits. This spatial hierarchy would form a basis of scaling and location for facilities as well as for planning infrastructure for future. For instance, a certain size of commercial complex would suit a specific level of hierarchy and could be guided to be located in a corresponding level of centre and so on.

e. Controlling Dispersed Development

The basic essence of the proposed concept is promotional in nature. It intends to control outward sprawl, nonetheless, through indirect measure of promoting development in certain spots. Although there would be certain control mechanisms to discourage/restrict greenfield development, the major focus would be towards shifting the incentive from invading into fringe areas to developing in already urbanized or urbanizing areas.

3.3.6 Challenges Posed by the Strategy

Some matters remain significant to make this strategy successful and efficient. These would not be considered limitations; rather issues that would require careful consideration and proper handling, especially in the prevailing socio-economic context, to run things smoothly. Otherwise these could limit the effectiveness of the mechanism.

a. Capturing Land & Property Price Rise

The centres would be focus of many activities and thus have very strong pull factors. As demand to develop and build in the centres rises, land and property price, and rent might soar and reduce affordability. The consequence can be a kind of socio-spatial marginalization where only people above a certain income level might be able to live in the proposed centres. An appropriate mechanism is therefore essential to capture land and property price in centres.

b. Mitigating Possible Conflict with Transport Hierarchy

Dense activity along fast moving transport channels might hamper speed and efficiency of traffic. As centres are placed along major transit corridors, proper segregation mechanism needs to be there that ensures clear demarcation of space for '*mobility*' and '*access*' functions. Only then can these two types of activities of exactly opposite nature can co-exist and function properly at the same time.

c. Harmonizing Nuisance from Mixed-Use

Mixed land use, if regulated well, can create a vibrant community and reduce need for excessive travel. If uncontrolled, however, it can create problems of its own. Centres are intended to be places of important public functions as well as high density housing. If these multiple uses are not harmonized properly the result can be nuisance. For instance, retail commercial units would generate goods carrying traffic which can be disturbing for local residents. Therefore, this kind of issues needs to be pre-planned to maintain an acceptable level of livability in centres.

d. Managing Out-of-Centre Development

The strategy is intended to provide a complete framework of hierarchical activities and services going down to the neighbourhood level. If the framework is not designed up to the lowest level, say only up to major centres, a lot of areas and local level functions would remain outside of the framework. This would create an incomplete and unrealistic structure. The system therefore would have to be designed to the lowest level of centres, through further detailed level plans, to make sure that no essential urban functions are left out.

CHAPTER 04 EFFECTIVE LANDUSE MANAGEMENT FOR LIVABLE DHAKA



CHAPTER 04

EFFECTIVE LANDUSE MANAGEMENT FOR LIVABLE DHAKA

4.1 Introduction

Land use planning is a public policy exercise to support achieving territorial development goals of a society. It comes with allocation and zoning of land for specific uses, regulation of the intensity of use, and formulation of legal and administrative instruments that support the land use plan. Land use planning decisions affect the amount and character of development, which ultimately brings about other interrelated and series of consequences. The chapter deals with the diverse development policies and tools for effective implementation of the plan.

4.2 Purpose of Land Use Planning

The purpose of land use planning for the revised structure plan of RAJUK is to classify whole RAJUK area into several functional zones and to guide detailed level land use planning at later stage to implement the proposed development strategies. Objectives of land use plan are:

- To ensure supply of land for different future urban use;,
- To harmonize among competitive and alternative uses of land;
- To make availability of land for accommodating rising population;
- To guide growth of city towards desirable pattern and direction;
- To conserve sensitive land areas for environmental protection, and
- To provide infrastructure for augmenting spatial development;

4.3 SWOT Analysis

This section of the chapter gives a short SWOT analysis of existing land use structure and the new policies proposed in the Structure Plan.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Availability of large undeveloped peripheral areas for planned development of land uses. • Wide right of way in most existing roads for future expansion of carriageway and provide mass transit facility. • Large number of peripheral urban centres for decentralization of core area activities. • Large undeveloped land in the city periphery for providing open space recreation. 	<ul style="list-style-type: none"> • New opportunities are there to develop suburban centres and sub-centres and Densification. • Reduction of population in the main city will reduce traffic in the main city easing movement. • Execution of new land use policies will cause overspill of population in the periphery and will reduce pressure on housing and services in the core city. • Integration of spatial development with transport corridor will reduce travel time and travel demand. • Proposed urban center based concept will bring under control dispersed development in suburban areas.

WEAKNESS	THREAT
<ul style="list-style-type: none"> • Rising land price in suburban centres. • Uncontrolled mixed use development in peripheral areas. • Indiscriminate development in outer urban areas making provision of infrastructure and services difficult. • Shortage of adequate of professional town planners both in RAJUK and municipal council planning units. • Ineffective implementation of the planning schemes and strategic plans. • Weak enforcement of land development regulations. 	<ul style="list-style-type: none"> • Scanty supply of capital might interrupt development of infrastructure and services creating uncertainties in policy execution. • Delay in execution of infrastructure development projects might accentuate problems of unplanned development affecting livability. • Without effective control over development, particularly in mixed use areas might hamper livability.

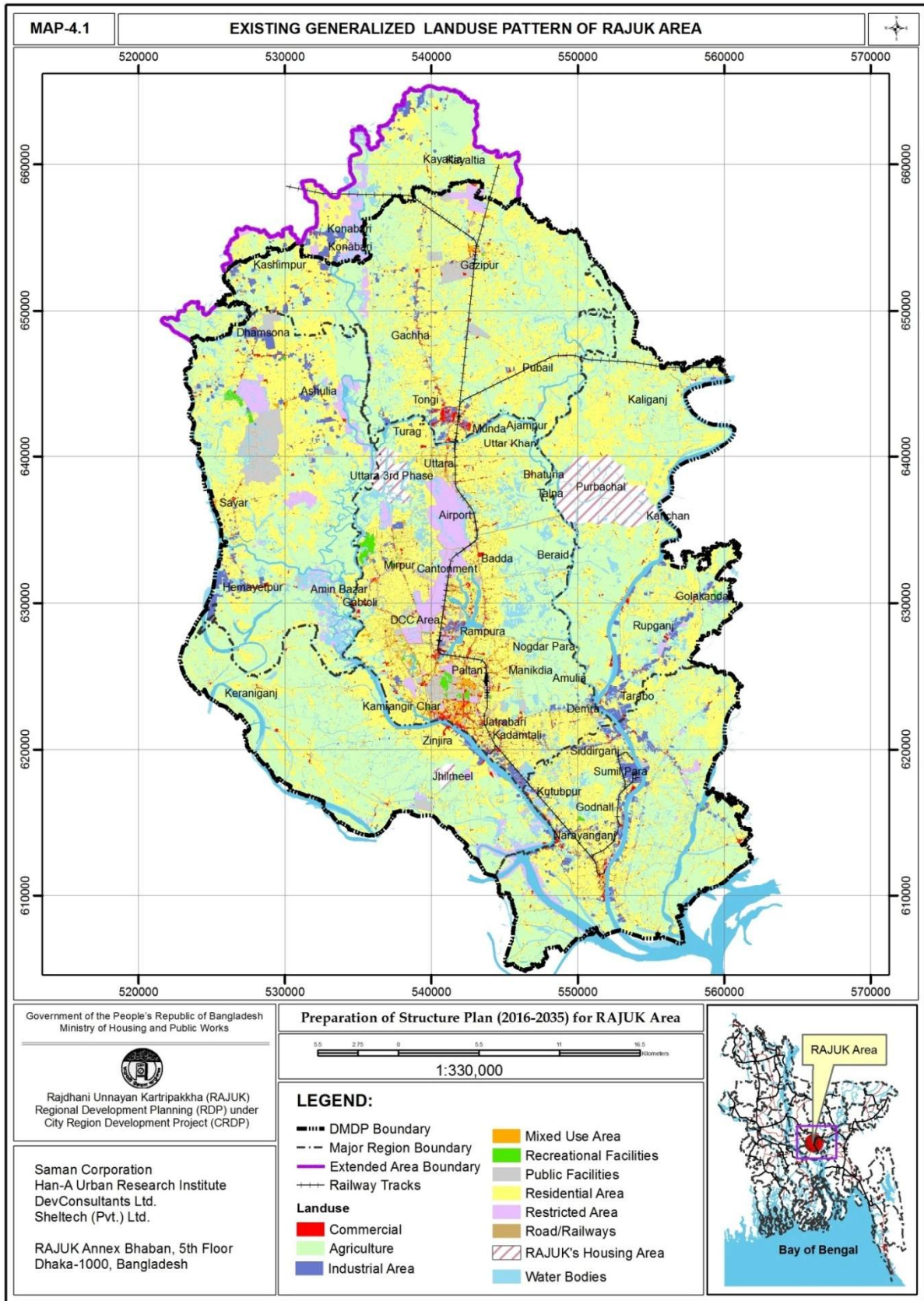
4.4 Scenario Analysis

4.4.1 Existing Scenario Analysis

Amid rapid growth of the capital city agriculture with almost 38.49% of the total area still dominates land use in the RAJUK area that reflect a strong rural character of the peripheral areas. However, agricultural land (including unused land) use is also sizable with more than 21.42% even in the Dhaka Central Region, and this could make a persuasive case for promoting the densification or in-filling developments within the existing urban area.

Residential land uses comprise 36.47% of the RAJUK area. Surprisingly, road and railways, considered as the most important infrastructure in a modern city, constitute only 2.3% of the total RAJUK area and 6.06% even in the Central Region. Another recent statistics indicate that roads capable of handling motorized vehicles comprise barely 2.5% of the area of Dhaka. Considering the road area ratio of minimum 15% as a conventional norm for efficient circulation management in most of the modern metropolises, it is indeed a serious concern for current land use in Dhaka and considered as a major reason for extremely severe traffic congestions in everyday Dhaka city. Industrial land uses also constitute a mere 2.61% in the mostly built up area of the Central Region, while the parks and open space comprising less than 1.0%, indicating a rather unique situation. Many modern metropolises around the world nowadays boast of green and open spaces of 20~30% of the total land area, and they even set aside huge tracts of land at central location as park for the citizens like in New York's Central Park. Very high density Hong Kong has 72.6% of its land area under agriculture, park and waterbody. For the comfort and health of the citizens of this mega city, Dhaka should indeed give extra efforts in securing and providing sufficient parks and open space. Combining the findings highlighted above, it would be misnomer to describe Dhaka as a pleasant and livable modern metropolis.

Another unique aspect of land use in Dhaka is the vast size of restricted area under airport and military and paramilitary establishment comprising almost 6.51% of the Central Region. The old airport site in Tejgaon and the Dhaka Cantonment, in particular, originally outside but now at the heart of the city, need to be better integrated with the city's urban fabric and the city's administrative framework.



The city's major transportation circulation network is severely distorted by bottlenecks created by these facilities. These facts were explicitly spelled out in the DMDP but have never been realized and it deserves a still more critical attention now.

Although permanent water-bodies (Rivers and khals/lakes) are not actually lands, they used to constitute a major proportion of urban space in Dhaka during the mid-20th Century (14% of total area in 1967 as found from the satellite image analysis). From the field survey, the share of permanent water-bodies has been found 6.8% (2013), while combining all categories of like rivers and khals/lakes/ponds/ditches/marshy lands etc. gives the figure of about 13% of the entire RDP area. It would be a gross mistake if we don't mention their role, which has been and will continue to be very essential for the livelihood of the large population. However, they have become the victim of ruthless sporadic urban encroachments by the profit-minded private developers and individuals during the past decade and the area of water-body sharply declined endangering the environmental sustainability of the city.

It is of critical importance to have the information about the availability and location of undeveloped lands remaining within the boundary of RAJUK area. Suggestions on rational future growth management can only be proposed when they are based on this actual information. According to the situations, discussions should follow whether to open up new developments at decentralized locations or up to the densification of existing built-up areas.

4.4.2 Future Scenario and Potential

a. Land Use Inventory and Analysis

Urban planning needs accurate estimation of land required to accommodate future growth. Understanding land supply and demand will allow make better plan for the provision of future services, primarily water, sewers, and transportation. Planning for overly optimistic growth can lead to increased community costs, scattered development, and unrealized expectations. However, the plan should establish a process by which growth trends are monitored so that plans can be modified, if appropriate, to reflect unanticipated trends.

b. Assessment of the Future Demand and Supply of Land for Major Uses

Current distributions of land uses in RAJUK area are still dominated by agricultural land use (**Table-4.1**); however not in the same proportion across the six planning regions (**Table-4.2**).

Table-4.1: Current Distribution of Detailed Land Uses in RAJUK Area

Land use category	Area in Acres	Area in Hectares	%
Agriculture	145670.85	58976.05	38.49
Residential Area	138013.93	55852.51	36.47
Water bodies	47641.60	19288.10	12.59
Restricted Area	11971.73	4844.81	3.16
Industrial Area	9873.09	3995.50	2.61
Public Facilities	9560.75	3869.12	2.53
Road/Railways	8705.54	3523.04	2.30
Commercial	3781.55	1530.37	1.00
Mixed Use area	2247.29	909.44	0.59
Recreational Area (Park/Play ground/Urban Green Area)	996.29	403.19	0.26
Total	378462.63	153192.12	100.00

Source: source: RDP Survey, RAJUK, 2013

The revised total area of RAJUK as per the GIS database is around 1528 sq. km. The population in 2011 (BBS) was 15,123,293. In between 2011-2015 with medium growth rate of 3.43% (assumed), the estimated population of RAJUK area will be 17,318,163 in 2015. With gradual decrease (by the implementation of appropriate policy measures) over the years within the period 2031-2035 (with expected medium growth rate of 1.43), the future population of Dhaka city for the year 2035 will be little more than 26 million considering the implementation of overall development policy throughout the country.

Table-4.2: Region wise Share (%) of Different Land Uses

Land use category	DCR	NR	ER	WR	SR	SWR
Residential Area	41.45	38.54	40.24	33.46	37.19	23.20
Agriculture	21.42	44.32	41.89	39.10	34.18	57.26
Water-body	13.03	7.07	13.15	12.04	17.84	14.32
Restricted Area	6.51	2.78	0.37	4.26	1.78	1.90
Road/Railways	6.06	1.51	0.88	1.59	1.79	0.98
Public Facilities	4.38	1.99	0.39	5.17	1.27	0.92
Commercial	2.32	0.76	0.51	0.60	1.04	0.40
Mixed Use area	2.05	0.23	0.02	0.27	0.57	0.10
Industrial Area	1.83	2.79	2.49	3.19	4.27	0.91
Recreational Area	0.95	0.01	0.07	0.32	0.07	0.00

Source: RDP Survey, RAJUK, 2013

Detailed Area Plan (DAP) of RAJUK completed in 2010, the area earmarked for residential (including rural homestead) land use was 41,498 hectares. But the actual residential area found in the 2013 survey of RDP project is 55,852.51 hectare (36.47% of total RAJUK area). This is due to the recent rapid development, both planned and spontaneous between 2008 and 2013. Population Census of 2011 shows, the present density of some areas in built up core part of Dhaka city (Old ward 25/new ward 02) is 1263 pph (**ref: working paper on 'housing and neighborhood'**). In Gandaria (Old ward 82/new ward 46) of old Dhaka the density is about 3,169 pph in the year 2011. Almost 1.55 million people have already been residing within 102.35 hectare area of these parts.

However, much of the outlying areas have a relatively low density of population. Even some areas close to city show the density less than 13 pph (Eastern Region). Some, therefore, speculate that the estimated future population could be accommodated within these areas if proper policy of urban development can be timely implemented like maximizing the use of under-utilized residential zone.

As per population density standard as ratified in the Private Residential Land Development Rule 2004, 70% of the land has to be utilized for residential purpose for approval of private real estate projects. From a purely arithmetic point of view, when we take the standard of the 2004 Rules (maximum density 350p/acre), more than 29 million ($33,937 \times 2.47 \times 350 = 29,351,460$) people can be accommodated, although in a very much congested condition. On the other hand, about 14,542 hectares of land was designated as rural homestead in DAP 2010 where, according to the Rule, the preferred density was given as 100ppa (247pph).

Applying these figures, some 3.59 million people could also be accommodated there. So if this population is deducted from the above population figure, then the net population habitable within the rest of the RAJUK area will be 25.76 million. Then the total figure stands: part of Central core 1.5 million + other parts: 25.76 million = Total 27.26 million.

However, the density standard stipulated in the “Private Residential Land Development Rules 2004” is far from being acceptable to support a decent livable city, and abruptly high indeed compared to other mega cities around the world.

c. Estimation of Future Population Density Level

The Revised Structure Plan is projecting the population for RAJUK area at around 26 million by 2035; addition of 10 million more over the present number and beyond. Following tables summarize the current level of population density and the projected density in the RAJUK area:

Table-4.3: Current and Projected Population Density in the whole RAJUK Area

	Area (ha)	Current Population (2015)	Avg. density (p/ha)	Pop. (2035)	Avg. Density (p/ha)
RAJUK	152,800	17,318,163	113	26,000,000	170
Net*	70,610		245		368
Residential	55,853		310		466

Table 4.4: Current and Projected Population Density in the Dhaka Central Region

	Area (ha)	Current Population (2015)	Avg. density (p/ha)	Pop. (2035)	Avg. Density (p/ha)
Central region	30,061.40	9,756,280	325	13,045,654	434
Net*	17,484.60		558		746
Residential	12,218.00		799		1068

Table-4.5: Current and Projected Population Density in the Other Regions* of RDP

	Area (ha)	Current Population (2015)	Avg. density (p/ha)	Target Population (2035)	Avg. Density (p/ha)
Other Regions*	122,738.60	7,561,882	62	12,893,323	105
Net*	53,286.72		142		242
Residential	43,390.10		174		297

Net* = whole area – (agricultural + water-bodies+ road/rail line+ recreation area)

Other Regions** = five other planning regions except Central Region

Data source: RDP field survey, 2013

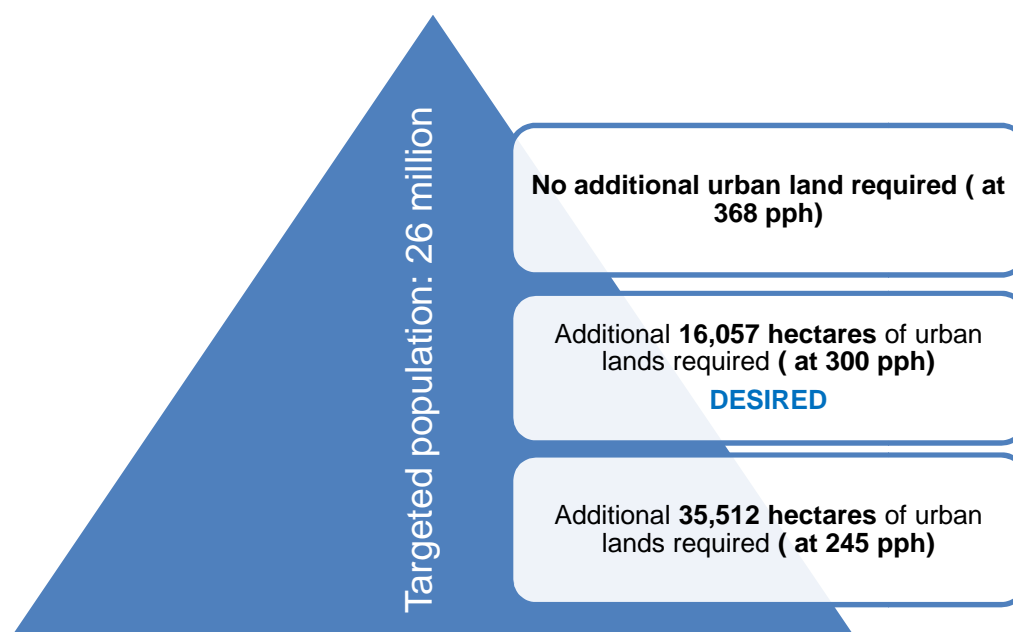
d. Estimation of Demand and Supply of Urban Lands Until 2035

Currently, total net urban lands of RAJUK area¹ is 70,609.69 hectare (ref: **Table-4.3**). According to the ‘Private Residential Land Development Rule, 2004 (amended in 2012)’, the threshold population density for any private housing estate has been determined as 350 ppa or 860 pph. Hence three different scenarios can be observed to estimate future land demand:

¹ Total urban lands = All RAJUK area – (agriculture land+waterbody+road/railways+park/openspace)

- If we follow the threshold density as per the 'Private Residential Land Development Rule's (PRLDR), 2004', existing urban lands can accommodate the projected 26 million populations. But this is already very high limit compared with other major populous cities; for example, the population density in Cairo city is 320 pph, Delhi 290 pph, Seoul 173 pph, Tokyo 142 pph, Jakarta 127 pph and New York 105 pph. Moreover, population is accommodated in those cities in high super structures. So obviously the prescribed density of PRLDR is neither desirable across the RAJUK area, nor the existing utility and infrastructure services can support such density.
- If we are to accommodate projected 26 million in 2035 by maintaining current level of average urban density in RAJUK area (245pph), we would need additional 35,512 hectares of urban lands most of which have to be converted from current agricultural lands. If, on the other hand, we utilize only the non-agricultural lands within RAJUK area to the maximum, the average urban density in the year 2035 will be 368 p/ha, which is also very high for pleasant habitation.
- Considering the situation of population densities in different cities, if we would like to accommodate the targeted population by 2035 at the **preferred density level 300 pph (Gross)**, we will need more 16,057 hectares of new urban land. To make sure the supply of this additional land, conversion of some agricultural lands is unavoidable in order to keep the ecologically sensitive areas which could become vulnerable to such conversion, too.

The above three scenarios can be represented by the following:



All in all, unless we decide to put up with the extreme congestion into the future, it would be simply inevitable to convert at least some amount of agricultural lands for urban purposes. It is critical to determine how these additional lands will be supplied. The priority candidates will be the 7,200 hectares from the DAP earmarked urban residential zone in the eastern area, which was found as agricultural lands in RDP survey. Also there is 14,542 hectare of rural settlement zone as earmarked in DAP. Hence, following tentative conclusions are made:

- Agreement among the consultants is to maintain the average urban density at 300 p/ha level in order to keep Dhaka livable; and also to minimize the agricultural land conversion (16,057 hectares). However, since the central Dhaka already exhibits far higher than the projected average density, accommodating more incoming population will have to be strictly avoided unless there emerges urgent demands for selective in-filling or vertical improvements.
- Improve and redevelop existing Central Region (no additional density), while accommodating most of the increase in population within the regional urban centers in the peripheral locations. Therefore, future new urban land developments will be mostly in “**Outer Urban Areas**” and “Growth Management Areas” in and around these centers.
- Each **Regional Urban Center** will be developed as self-containing urban community with employment opportunities and everyday living amenities (schools, hospitals, shops, parks & open space and community facilities). Ample green and open spaces need to be secured between these centers and also between them and Dhaka to create comfortable and relaxing community ambience for the residents. Hopefully, the RAJUK area would look like one huge agglomeration from the sky, but on the ground, citizens will feel like they are a resident of a smaller community.

e. Land Use Classification of Structure Plan 2016~2035

DMDP Structure Plan did not make any land use planning classification of the RAJUK area in a traditional way. Its Structure Plan identified some strategic areas where future development will take place and provided strategies and techniques for future spatial development, particularly in new areas.

In land use plans of regional scale, as is the case of RAJUK area, it mainly denotes larger areas of relatively homogeneous function and character at present, and to be managed similarly in the future. Main focus is on segregating the areas for active future developments and the areas for passively preserving purposes. Existing urban areas and quickly urbanizing areas come under former category, while the latter encompasses the agricultural areas and natural conservation areas. Detailed designations of specific usage for each parcel of land are done in local level plans.

Based on the above framework, a two-tier zoning regulation is proposed in the Revised Structure Plan. For the first tier, whole RAJUK area is divided into two strategic zones like Urban Promotion Area (UPA) and Urban Control Area (UCA), largely based on the possibility of future urbanization (**Map-4.2**). In the next Urban Promotion Area has been further sub-divided into three strategic management areas like Central Urban Area, Outer Urban Area and Growth Management Area etc, while Urban Control Area has been sub-divided into two strategic management areas like Agriculture and Conservation Area etc. And in the second tier, designation of detailed land use zones and permitted or prohibited activities for each zone will be spelled out in local or detail land use plan under DAP. Thus, zoning at the structure plan level broadly delineates broad strategic management areas, and it should be followed in the detailed area plan (DAP) or other action area plan at local level.

Table-4.6: Reclassification of Land Use Categories

Strategic Zoning		Tentative Detailed Zoning
Dhaka Structure Plan (1995-2015)	Dhaka Structure Plan (2016-2035)	Detailed Area Plan (2015-2020)
Agricultural Area Agricultural High Value Area	Agricultural Area (under UCA)	Agricultural Zone Rural settlement zone

Strategic Zoning		Tentative Detailed Zoning
Dhaka Structure Plan (1995-2015)	Dhaka Structure Plan (2016-2035)	Detailed Area Plan (2015-2020)
Established Urban Area	Central Urban Area (under UPA)	Residential Zone I, II, mixed Commercial Zone I, II, mixed Industrial Zone Open Space Zone Conservation Zone
Urban Fringe Area	Outer Urban Area (under UPA)	Residential Zone I, II, mixed Commercial Zone I, II, mixed Industrial Zone Open Space Zone Conservation Zone
New Urban Land Development Peripheral Urban Development Special Area Cantonment Security Zone	Growth Management Area (under UPA)	Same as in CUA, OUA + UCZ
Main Flood Flow Area Sub Flood Flow Area Retention Pond Water Body Pubic Facility Area (part)	Conservation Area (under UCA)	Conservation Zone
Pubic Facility Area (part)		(Institutional Zone)

*Proposed public facility area is included in selected land use classification

Designation criteria for each strategic management area are provided in **Table-4.6**. They are more substantive over the 13 categories of zones selected in the DMDP structure plan and urban area plan level. The proposed zones are as following and are shown in **Map-4.3**. It is to be understood that preparation of Detailed Area Plan (DAP) will only be needed in the Central and Outer Urban Areas and in the Growth Management Area, as no new urban activities are going to be allowed in the Agriculture and Conservation Areas. Nature and Future Growth has been presented in **Table-4.7** and descriptions of each strategic zone have been given below:

Table-4.7: Nature and Future Growth Direction of Proposed Strategic Zones

Strategic Zone	Location	Nature	Growth Direction	
Central Urban Area	Mainly Dhaka CC North and South	Established Urban Area (urban LG unit Boundary)		
Outer Urban Area	Mainly Narayanganj CC, Gazipur (Old Pouroshava), Tongi (Old Pouroshava), Savar, Tarabo, Pouroshava etc	Established urban area (urban LG unit boundary)	Urban Area	Promotion
Growth Management Area	Rest of the DMDP area other than the previous two and all conservation areas	Mainly developing areas where land is being transformed from rural uses like agriculture to urban uses e.g. residence, commerce, industry etc.		
Conservation Area	Flood flow zones, Water Retention Area, National & regional parks, Forest Area,	Environmentally sensitive areas that need protection	Urban Control Area	

Strategic Zone	Location	Nature	Growth Direction
	large scale Heritage sites, River and Khals;		
Agriculture Area	Agricultural zone of DAP at present	Prime Agriculture lands	

Source: Compiled by Consultants

- **Conservation Area (CA)**

The zone is to conserve, enhance and promote the characteristics as it has been retained over the years and to make disaster sensitive land use for environmental protection (**Map-4.3**). Environmental critical areas (ECAs) as demarcated by Department of Environment and Forestry, parks, water bodies (River/khal/lake/water retention area), **flood-flow zone**, National Forest, historical sites etc have been included in conservation area. Agriculture uses can be permitted within this zone. By negative approach, **no new construction should be permitted in this zone**. The discrete rural homesteads already existing within this zone are to be given the 'de facto right' to remain there. However, they should not be allowed to make major changes of their existing structure.

Many Private sector agencies have been and are acquiring large tract of land in remote and isolated locations, mostly in conservation areas to promote the development of new satellite and high standard model housing projects, filling the land with loose and excavated soil of inherent unstable qualities and ignoring geological evidence and data regarding environmental consequence, the potential and increased risk of subsidence and water logging of land filling these areas. The **RDP Structure Plan does not support this kind of development** as they are not in the line with current strategies and policies of Structure.

In preservation of some areas, '**Transfer of Development Rights (TDRs)**' could be an effective mechanism. TDR allows the transfer of development right from one parcel to another. 'Sending area' is preserved from future development while the 'receiving area' is developed more intensely than is permitted under baseline zoning.

The sending areas can be environmentally-sensitive areas, open space, agricultural land, historic landmarks or any other places that are important to a community. The receiving areas should be places that the general public has agreed are appropriate for extra development because they are close to jobs, shopping, schools, transportation and other urban services. Hence, RAJUK should designate sending and receiving zones. TDR programs provide private sources of funding for conservation efforts and make development more predictable by eliminating the need for variances. A simple illustration of TDRs can be like as shown in **Figure-4.1**:



Figure-4.1: Illustration of Transfer of Development Rights²

A variation that can be made on the TDR concept is the marketable development rights (MDRs) idea, in which a certain portion of all land is set aside for preservation, and the rights for the remaining percentage are traded between developers and landowners.

Flood flow zones are integral part of conservation area, of which details have been presented in **Chapter-08**. There is huge debate on the demarcation of flood flow zone in current DAP among the various vested interest groups. Therefore, considering the immense pressure on the flood flow zone as determined during DMDP structure plan and subsequent DAP, a separate hydrological study or project should be undertaken immediately by Bangladesh Water Development Board, Department of Environment (DoE), RAJUK and BUET like institutes to revise the area of flood flow zone.

²<http://cvillemorrow.typepad.com/a/6a00d834519bec69e201116887976b970c-320wi>

Box-4.1**Development in Flood Flow Zone: Dhaka Uddyan Area**

Dhaka Uddyan is a recently developed area located in the western part of the city beside the Turag River. The area accommodates a private medical college, an under construction army graveyard, *Badhya Bhumi Smriti* Soudha (Slaughter-place Memorial). Real estate companies have developed a number of housing estates in the area raising the low lands. Recent survey by RDP shows, there exist 2827 structures in the area of which over 53% is permanent and 10% having 3-9 stories. The trend of development here continues uninterruptedly.

DMDP Structure Plan (1995-2015) designated this area as a part of the main flood zone where any kind of development including land level raising via land filling was strictly prohibited. The proposal was endorsed by Detailed Area Plan (DAP) prepared following Structure Plan. Geological Survey of Bangladesh (GSB) has recently prepared a map called **Engineering Geological Map for Dhaka Central Part** where it delineates the sub surface soil suitable for urban development. From GSB study it is evident that the entire Dhaka Uddyan area is covered by high and low floodplain deposits which are generally flat above annual flood level and naturally medium compacted and low plastic with moderate PGA (Peak Ground Acceleration) potential. The area has been described suitable for moderately good for light civil construction with proper foundation, but to be preceded by detailed geotechnical investigation. The study also shows that building ground of the site is vulnerable for high rise construction. Only light structures (<6 storied) with the foundation depth of 9-12 meters and heavy structure (>6 storied) with the foundation depth of 12-15 meters can take place in the area. Furthermore, it is strictly recommended for detailed sub surface geo technical study before venturing into any kind of individual civil infrastructure foundation and design.

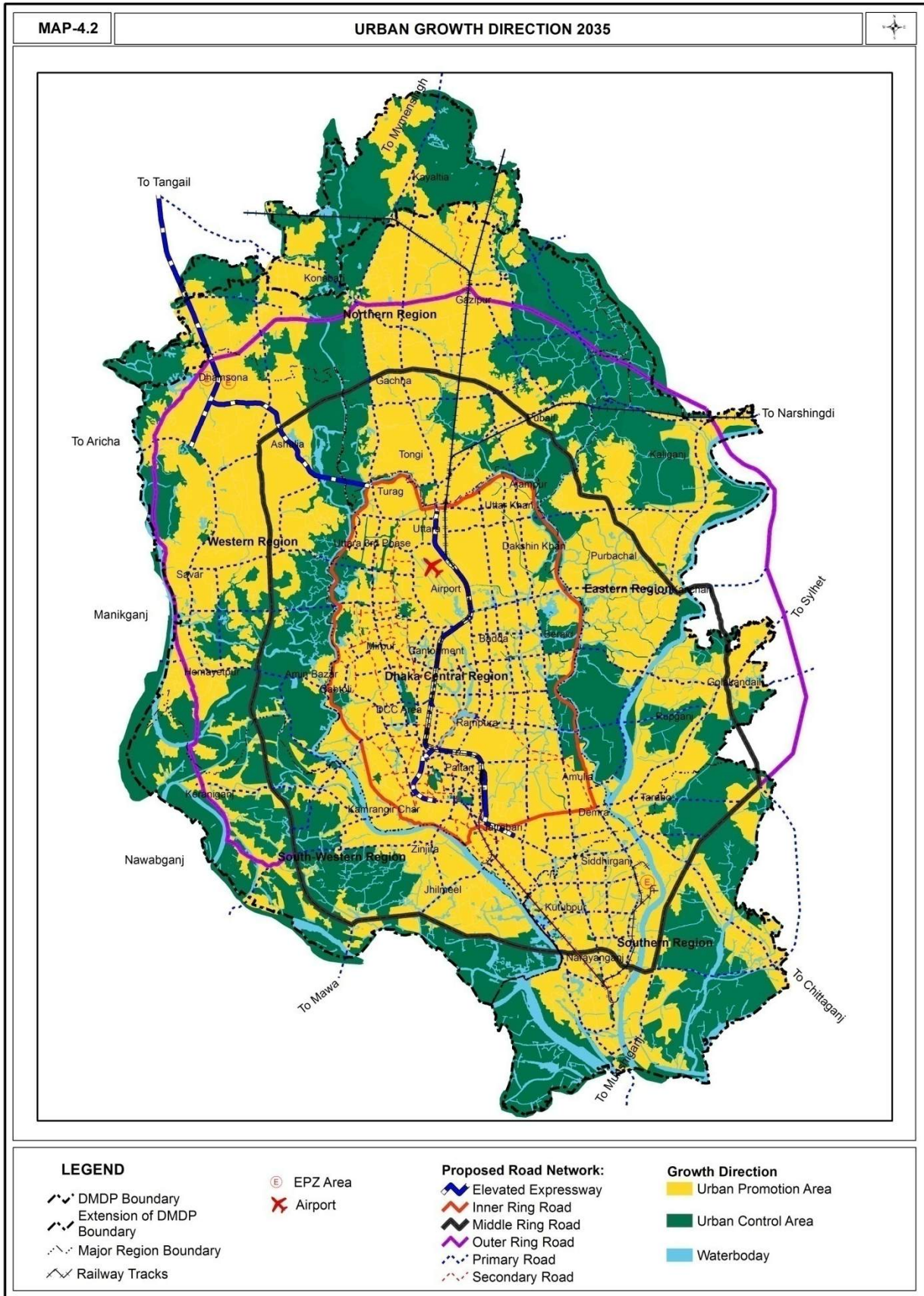
In view of the development already taken place in the area, the area has been put under Central Urban Area (CUA) of the current Structure Plan. But to relieve the area from drainage congestion, the available natural drainage system in the area has to be strictly preserved. Preserve and maintain appropriate opening in between mound that are essential to allow uninterrupted flow of annual flood water and safeguard the hydrological system. Building construction shall mandatorily follow GSB guidelines as attached in **ANNEX-11.1**.

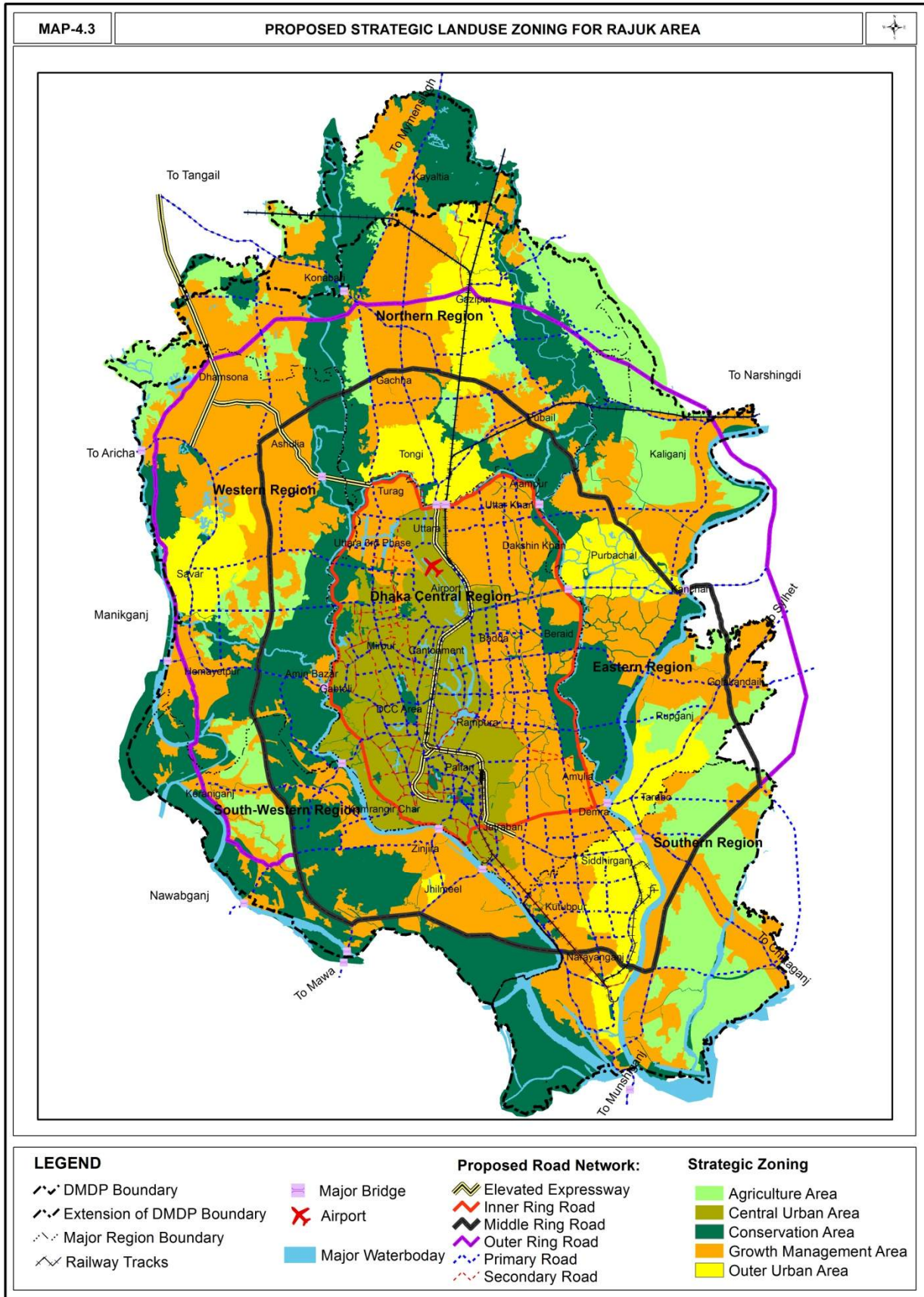
However, the question remains, how long the plans will continue to accommodate these kind of unauthorized developments when the controlling authority is failing miserably to prevent them in the first place.

- **Agricultural Area (AA)**

Agriculture area is mainly the high yielding prime agriculture lands, which need to be preserved for future food security (**Map-4.3**). As the primary objective is to protect valuable agricultural lands from urban encroachment, any sizable new urban developments will have to be restricted. Rural settlements with **dwelling and agriculture** related facilities shall be allowed. While Conservation, Agricultural Areas are to be directly regulated under the Revised Structure Plan, CUA, OUA and GMA are regulated through subsequently prepared detailed area plans (DAP).

High value agricultural lands as marked by DMDP in the north of Savar and part of Gazipur, are mostly high lands that do not produce crops such as paddy. These high lands are good for vegetable and horticulture. Taking advantage of flood freeness of the lands huge industries, business and services have developed in this area that also includes habitations. It is not pragmatic to suggest reversing the land use and convert those into farm lands, as per DMDP.





- **Central Urban Area (CUA)**

The two city corporations of Dhaka are mainly classified as Central Urban Area (**Map-4.3**). This area is characterized by concentration of residential, commercial, industrial, financial and other non-agricultural uses, unplanned densification of building structures. This area has little scope for horizontal expansion but still attractive for some residential development because of accessibility to jobs and other activities. CUA would require diverse treatments for ensuring livable and sustainable urban environment, e.g. redevelopment of older area, securing open spaces, constructions of super high rise structures (10 storey+) and further densification of built-up areas and preparing revised landuse plan of some both planned and unplanned areas to accommodate population who want to live near working places. Residential, mixed use development, commercial, opens space, light industrial (IT based) etc. and supportive uses (Healthcare, Administrative, Institutional and utility services etc) will be permitted in Central Urban Area, (Please see **Table-4.6**).

- **Outer Urban Area (OUA)**

Apart from bifurcated wings of Dhaka City Corporation, built-up core areas (mainly old municipality area) of two other city corporations namely, Gazipur and Narayanganj along with two municipalities (Savar, and Tarabo) are included in this OUA (**Map-4.3**). Major focus will have to be given to promote planned urban development, in terms of planned housing development, creation of more job opportunities, providing adequate infrastructure with efficient connectivity with core city and public facilities to make the areas livable and more functional. Each of the urban centers and sub-centers of this zone has respective local government, which are vested with preparing land use plan for the respective urban area. Residential, mixed use development, commercial, open space, industrial zone (with ETP) etc. and supportive uses (Healthcare, Administrative, Institutional and utility services etc) will be permitted in Outer Urban Area, (Please see **Table-4.6**).

- **Growth Management Area (GMA)**

They are mostly transitional areas changing from rural to urban, and could have much potential for future urbanization and development activities. It is understood that new land conversion will continue to occur, particularly in locations adjacent to presently developed and developing areas and in spite of high flood risk and a paucity of infrastructure services and other social and community services provision. This form of development is taking place in the absence of proper planning and development control and without any due regard to fragile eco-system and natural and vulnerable drainage system. Careful local plans (or DAP) will have to be prepared to guide and accommodate future urban growth, and to prevent chaotic development activities. Remaining areas other than CUA, OUA, CA and AA where trend of potential urban growths and industrial/garments agglomerated areas exist within the planning area; have been designated as GMA (**Map-4.3**). Residential, mixed use, commercial, adequate opens space, industrial zone (with ETP) etc. and supportive uses (Healthcare, Administrative, Institutional and utility services etc) will be permitted in Growth Management Area, (Please see **Table-4.6**). All kind of industrial development with mandatory provision of ETP, besides minimum harmful to environment will be highly encouraged to develop in GMA of Western, Northern, and Eastern and South-Western Region of RAJUK area. Existing conservation areas within GMA like river/khal/lake/waterbody/open space/forest area must be preserved. Cluster of settlements which are in rural character earmarked within GMA, may be categorized under rural settlement zone. Within the GMA, in addition to the conventional detailed land use zones, "**Urbanization Control Zone (UCZ)**" can be designated, only selectively, in detailed area plans when some areas are not yet matured for immediate urban development. In UCZ, all urban land developments can be deterred for a certain period (5~20 years).

GMA would also include already approved key development project locations by RAJUK within CA and AA like housing and transportation mostly. Those will be given the exceptional status similar to the "de facto rights" for existing settlements and eventually changed to GMA.

4.5 Critical Issues and Challenges

Issues associated with the land use and its planning is multifarious and complex. The most critical issue in realizing a future land use planning proposal would be the matching between the demand for land and their possible supply in terms of amount and locations. While there exist a huge amount of developable lands in the peripheral locations within the RAJUK area, land is in short of supply in the city core of Dhaka and its immediate vicinity. The case is not peculiar to Dhaka and, in fact, virtually all the fast growing cities in the world are facing similar dilemmas. However, the current land use situations in Dhaka exhibit a few more problematic aspects in addition to the aforementioned shortage issue as stated below.

- The prominent characteristic of the land use structure of Dhaka is the mixed nature of uses, particularly in the traditional old city areas; therefore, strict zoning does not function. Even in the modern commercial, residential, and industrial areas developed in a planned and segregated manner since the 1980s, imposition of strict zoning has been difficult. These areas are also gradually being transformed into mixed use areas, and experiencing substantial increase in the density. It makes the purpose of land use planning quite dubious sometimes.
- Spiraling of land prices seems to aggravate the difficulties in housing and infrastructure provision for the citizens. Growing population pressure and increasing income have all contributed to a rapid escalation of land prices, especially in major metropolitan areas like the city of Dhaka and Chittagong. For example, between 1972 and 2010, land prices in Dhaka city grew by an average of 100% a year. Allowing for the average inflation rate of 9% between 1972 and 2010, real land prices in Dhaka have grown by a whopping 91% per year (Policy Research Institute Report, 2012).³ The situation is partly attributable to the prevalent land hoardings by some rich individuals and land developers. Without efficient taxation to recapture the windfall gains, the excess demand for land and real estate will continue that can easily have a further spiral effects on the price.
- Frequent observation of linear or ribbon type commercial development along the major corridor. This situation is a common phenomenon where adequate accessibility can only be secured along the major roads, and other secondary road networks are lacking or insufficient.
- The problem of RAJUK being the planning authority and, at the same time, land developer itself is a sensitive issue for effecting land use planning and policies. RAJUK, as mandated by the Town Improvement Act 1953, should be responsible primarily to plan, control develop infrastructure. RAJUK's interest for land development and selling is highly criticized among various groups of stakeholders as this practice primarily benefits the privileged classes of the society.

³<http://www.theigc.org/publications/policy-brief/evaluation-tax-system-bangladesh>

4.6 Future Plan and Direction

4.6.1 Goal

EFFECTIVE MANAGEMENT FOR LAND USE AND SPATIAL GROWTH FOR LIVABLE DHAKA

To make future Dhaka a more livable and globally competitive metropolis, many efforts will be required to lead future development in more efficient, effective and sustainable ways in addition to enhancing the quality of urban space.

4.6.2 Objective and Policy

It is realized that Dhaka city core is already saturated with development and there is hardly any horizontal space for further development. However, as long as major financial, commercial and administrative functions are within this region, demand for new developments will persist. But considering the carrying capacity of existing utility and transport infrastructure and limited scopes to enhance the facilities, further densification within the city core is almost impossible unless new urban development policies are formulated. Rather, a thoughtful and careful approach should be needed to upgrade the quality of living in the city core.

While much of the core part of Dhaka is already heavily populated, surrounding towns and peri-urban areas are relatively sparse. And these lands will have to accommodate a large share of the anticipated 10 million more population during the next 20 years. The primary objective in land use management is, therefore, to make these new developments happen in a very efficient manner at proper locations mobilizing various resources of the society. In this section, some key policy directions to be adopted in all 5 strategic management areas are discussed first, followed by area-specific policy options for each management areas.

a. Utilization of Diverse Methods of Financing for Development

To lessen the burden of government's financial responsibility, various forms of financing methods have been devised and utilized globally in the name of public private partnership (PPP). They are usually adopted in financing the building of key infrastructure facilities. All the urban and infrastructure developments require huge amount of financial resource either from the government purse or from other public entities. PPP has proven to be effective globally in mobilizing private financial resources for building major infrastructures.

Another line of collaborative financing involves the participation of landowners within the housing development project. Land Readjustment have been widely utilized in East Asian countries like Japan, Korea and Taiwan to reduce the government spending in the provision of essential public facilities and infrastructure in their residential area developments. Much of the cost are borne by the participating landowners by contributing some portion of their original plots in return for a fully serviced, regularized buildable plots bit smaller in size but greater in value.

Following financing policies are proposed to fulfill the objective:

OBJECTIVE-LDS 01: TO REDUCE GOVERNMENT BURDEN IN PROVIDING ESSENTIAL INFRASTRUCTURE AND SERVICES.

Future city needs huge infrastructure which the government alone cannot accomplish with its own resources. Applying various participatory techniques government can save huge public money that can be diverted to other development projects.

Policy-LDS/1.1: Utilize PPP Schemes in Major Infrastructure Development in Potential Urban Areas.

PPP method will save public money that can be used to fund other important development projects for infrastructure development.

- **Strategic Action:**
 - Adopt as a policy in the relevant government ministries and prepare the standard implementation procedure and negotiation principles.
- **Implementation Tools:**
 - RAJUK, in consultation with the Ministry of Roads and Bridges, shall take up pilot projects where urban development with large infrastructure will take place in the near future.
- **Implementing Agency: RAJUK, related Government Ministries.**

Policy-LDS/1.2: Initiate Participatory Land Development Techniques

Participatory land development techniques will accrue many benefits. It will save public money for development of infrastructure and will ensure planned development with adequate services and provide decent living environment.

- **Strategic Action:**
 - Adopt as a policy in the National Housing Policy and take up projects in new areas with low density at semi-urban location. Clear land titles and consensus of majority landowners necessary.
 - Create a separate "**Urban Renewal Cell**" in RAJUK, City Corporations and Pourashavas.
- **Implementation Tools:**
 - Take up more projects based on Land Readjustment (LR), Guided land Development (GLD) and other participatory land development techniques.
 - Allocate budget for execution of a pilot project.
 - If found successful, prepare formal legislation to support these projects.
- **Implementing Agency: RAJUK, Local Government Agencies, and NHA**

Policy-LDS/1.3: Evolve Methods to Realize Full or Part of Infrastructure Development Cost from the Beneficiaries: Betterment Levy

It is a levy on the part of the landowners for the benefit he/she gain (in the form of land value increase) from the installation of public infrastructure, mostly the major streets in urban areas. Fair evaluation of the land parcel before and after the infrastructure developments is essential.

- **Strategic Action:**
 - Prepare necessary implementation procedures of the levy.
 - Amend or update the provisions in the TI Act 1953 for easier application in practice.
- **Implementation Tools:**
 - RAJUK provide guidelines for designating 'affected areas' by the infrastructure development.
 - Accurate valuation techniques need to be quickly acquired to adequately administer the levy.
 - RAJUK will take up pilot project in this regard and if successful shall disseminate the idea to its other projects.
 - Other agencies may borrow the idea of betterment levy and apply in their projects as well.
- **Implementing Agencies: RAJUK, LGED, City Corporations and Pourashavas.**

b. Stratified Development Control

To potentially use the underdeveloped land across the RAJUK boundary, it is necessary to encourage selective vertical expansion. Statistics from field survey and census data ascertain that the average residential building in the Dhaka Central region is roughly 2 storied. Given the perceived impact of existing building density in the city core, further horizontal expansion is utterly undesirable within the city core (e.g. DCC North and South). Ingenious policy programs should be constantly devised to discourage the crowdedness of buildings by injudicious horizontal expansion.

According to the geological information, however, some areas within RAJUK area are found to be susceptible to natural disasters. With the constant developments in related technology, many of these drawbacks could be lessened if not avoidable. Nonetheless, as one single inattentive act could lead to irreversible loss of precious lives and properties, it is always desirable to be prepared. In this regard, disaster prone areas need to be clearly identified and be known prior to all developments so that necessary measures could be deployed to prevent possible disasters (More discussions in the **Chapter 11**).

Currently, Geological Survey of Bangladesh, in collaboration with German government, is conducting a study on Geo-information for Urban Development in Bangladesh. The study has identified, within RAJUK boundary, the lands suitable and unsuitable for urban development including infrastructure development. The study is based on sub-surface land formation analysis and the bearing capacity of land for urban development. The study has identified 'poor' areas that are unsuitable for infrastructure development. The study has shown very poor zones in some established urban areas (like, Narayanganj/Tarabo). Since these zones fall within already developed urban areas, effective protective measures will have to be taken during construction to save the structures from possible collapse caused by structural failure. It has recommended measures for any development in the poor areas as presented in **Annex- 4.1**.

Inevitably, Dhaka Central region still attracts migrant population as it has most of the job places, better service facilities and availability of daily needs and supply of utility services. Based on the survey data, projected population densities (net, gross and residential) are calculated as shown in **Table-4.5**. A composite measure of development intensity, derived from the form and size of buildings together, provides a clearer sense of the use of land. For Dhaka, so far two parameters, i.e. population per acre and FAR (in association with maximum ground coverage) are being used to control the development density and intensity, respectively. While population per acre (350 populations per acre) is a maximum gross level controlling mechanism enacted by RAJUK, FAR and MGC are followed in accordance with "Building Construction Rules 2008". These latter parameters are derived based on the plot size and adjacent road width. However, these parameters do not seem to work well for controlling the development intensity as they are applied independently in the case of development in Dhaka.

Therefore, the necessity of a unique tool is highly required to plan for future development intensity. To determine maximum building intensity, land use zoning categories should be taken in consideration. Based on the nature of strategic zones proposed in this document, development controls in the form of FAR and MGC should be done at the local detailed land use plans. As mentioned above, these critical ratios will be suggested differently for each of the land use zones which are designated mostly on a block level. When all the policies and planning ideas of the Revised Structure Plan are properly executed, it is anticipated that the overall development density in the year 2035 (expressed in terms of the FAR ratio) for the whole RAJUK area will be roughly 1.7~1.8. Central region will have higher value but not more than 3.6 while the outlying peripheral

regions will show figures of around 1.2

This is the objective set to improve development control in the RAJUK area:

OBJECTIVE-LDS 02: TO IMPROVE DEVELOPMENT CONTROL SYSTEM

Concerned policies to implement the objective are as follows:

Policy-LDS/2.1: Strengthen the Inspection/ Monitoring System after Building Plan Approval

Most violations to approved plan and unauthorized development can be avoided by undertaking close monitoring of building construction.

- **Strategic Action:**
 - Strengthening the inspection manpower of RAJUK. Reporting of inspection and taking legal action against violations.
- **Implementation Tools:**
 - Decentralize development control offices.
 - Delegation of development control to local government may also be tried.
 - Employ more manpower for inspection.
 - Take legal punitive measure against rule breakers.
- **Implementing Agency:** Ministry of Housing and Public Works, RAJUK, City Corporations and Pourashavas.

Policy-LDS/2.2: Revise FAR to Suggest Zone-wise Maximum Limit Ratio

Suggest maximum limit ratio (MGC, FAR) for each detailed land use zones. Determination of upper-limit ratio (MGC, FAR) for each detailed land use zones will determine maximum volume of building and enable the height control. This will also help to make estimation of zone-wise services and facilities possible. This will also ensure appropriate balance between the residential density population of an area and the capacity of the existing and planned facilities and infrastructure required to serve it.

- **Strategic Action:**
 - Amendment of BC Rules
 - Prepare provisional density control measure before the amendment.
- **Implementation Tools:**
 - Take a policy decision to change the existing flat FAR system.
 - Gazette notification of the amendment.
 - Apply them in the preparation of forthcoming DAP
- **Implementing Agency:** Ministry of Housing and Public Works, RAJUK, Local Government Agencies.

Policy-LDS/2.3: Preparation of Regulations on Land Use for Disaster Risk Reduction. (Detailed discussion provided in Chapter 11, Policy-UDM/1.3)

c. Compact Urban Development

Rather than focusing on individual parcel based development, to ensure planned and compact urban development, it is desirable to utilize Planned Unit Development (PUD). Planned Unit Development is a method of compact land development which promotes large scale, mixture of compatible land uses and dwelling types. It clearly departs from the old traditional application of zoning regulation by the plot or small block scale. The clustering of residential land uses makes it possible to provide public and common open space as well as some commercial spaces within the

project site. This would enable more flexible and innovative design ideas to set in and could produce more livable urban spaces.

Following is the objective set for attaining block based development:

OBJECTIVE-LDS 03: TO PROMOTE COMPACT URBAN DEVELOPMENT

This method of residential development will reduce travel to everyday destinations, reducing unnecessary traffic on the street which will help ease traffic congestion. The dwellers will enjoy many social and economic services close to their doorsteps. Compact development, on the other hand, can also secure much needed open spaces for the residents and citizens. Transit-oriented development (TOD) schemes also need to be promoted for the compact growth of the regional growth centers in outer locations. Relevant policies to achieve the above objective are as follows:

Policy-LDS/3.1: Utilize PUD Concept for Block-based Housing Development

Mixed and compatible land use provisions within a residential cluster will enhance convenience for the residents and, at the same time, will reduce the traffic movements from the residential area.

- **Strategic Action:**
 - Utilize the method as a technique of development in the policy and incorporate as a part of development control legal document
 - Prepare Standard Procedures for PUD Development.
 - Suggest criteria/standard for community facility within the PUD project site
- **Implementation Tools:**
 - After necessary amendments, incorporate the concept in the existing Private Residential Land Development Rule.
 - Make necessary amendments in TI Act1953 also to legally incorporate the provision in the law.
- **Implementing Agency:** RAJUK and Local Government Agencies.

Policy-LDS/3.2: Make The Urban Centers as Attractive Place for Living.

Unhealthy living place, traffic congestion, air and noise pollution, etc are the most common phenomena of our daily life in unplanned cities. Cities with less congestion, less pollution, fewer accidents, and healthier, safer, more productive communities are desirable for living to every dweller.

- **Strategic Action:**
 - Promoting urban centers with appropriate densities, services and facilities.
- **Implementation Tools**
 - Locate development near high-quality public transport.
 - Optimize density of existing built-up areas and transit capacity;
 - Increase mobility by effective traffic management; (**Objective 03 of Chapter 05**);
 - Creating more attractive and lively suburban centres;
 - Ensuring all urban centers are well connected by transport network, (**Policy-Trans/1.1 of Chapter 05**);
 - Provision of more mixed uses in the urban centers;
 - Locate the job opportunities with short commutes (**Chapter 07**);
 - Develop neighborhoods that promote walking (**Policy-HN/5.1 of Chapter 06**);
 - Introduce school zoning concept to reduce travel demand (**Policy-EDU/1.1 of Chapter 08**);
- **Implementing Agency:** RAJUK, DTCA and Local Government Agencies.

Box-4.2: Cases for Development around Transit Station**CASE # 01: Apartment Size 1200sft**

1. **Radius** # 400 m from a Mass Transit Station

2. **Area** # 506816.3 m²

3. **Total Building area** # 202726.52 m² (considering 40% area will be for structural establishments while 60% will be kept open for streets, walkways, recreational and landscaping purposes);

4. **Apartment Size** # 1200sft (111.48 m²)

5. **Floor Height** # 24

6. **Number of Apartments** # 1818

7. **Total Building Floor Area**

18,833,910 m²

CASE # 02: Apartment Size 1000sft

1. **Radius**

400 m from a Mass Transit Station

2. **Area** # 506816.3 m²

3. **Total Building area**

202726.52 m² (considering 40% area will be for structural establishments while 60% will be kept open for streets, walkways, recreational and landscaping purposes);

4. **Apartment Size** # 1000sft (92.90 m²)

5. **Floor Height** # 24

6. **Number of Apartments** # 2182

7. **Total Building Floor Area** # 18,833,910 m²

OBJECTIVE-LDS 04: PROMOTE LAND USE AND DEVELOPMENT AT MAJOR MASS TRANSIT NODES

BRT and MRT stations, by their very nature are a focal points for development, because of the immediate direct access they provide to a high quality transportation system that is able to move large volumes of people, in a dependable and predictable manner, and at a reasonable cost. As such, the areas surrounding the stations are prime locations for development in general and high density development in particular.

Mass transit-related land development policies should work towards creating communities that are compact, mixed-use activity areas centered on a station that by design encourages residents, workers, and shoppers to use the metro system. The station is the centerpiece that connects the residents and workers to its outer regions as well as the civic and public spaces that surround it. The land development policies must emphasize pedestrian-oriented environments, and encourage use of the public transportation system.

Policy- DS/4.1: Scaling of Development at Transit Stations

In analyzing the general scale of the potential development that could occur around a station, it is found, for example, that for a 400 meter area surrounding one station, buildings constructed at a height of average 24 floors will result in a total building floor area of nearly 18.9 million square meters, assuming 40% of the total land area that the building will actually occupy when completed (building footprint) and 60% used of the total land area for other purposes (e.g. streets, walkways, open space, landscaped areas, etc.). Building constructed to 36 and 12 floor heights would result in total building floor areas of about 28.25 and 9.42 million square meters, respectively.

- **Strategic Action:**

- Preparation of Station Area Oriented Plans and pragmatic environmental impact statements, with geographic limits, development policies, land use regulations, design standards, capital improvement program, and financing measures integrated into a coordinated process that correlates land uses with supporting infrastructure, and developers.

- **Implementation Tools:**

- Transit station areas are excellent locations to encourage a mix of different land uses and development. The mix and density of land use at station areas has a direct impact on the function and character of a community and, in turn, influences ridership. The more people that live and work in, or are otherwise attracted to, a station developed area, the greater opportunity for encouraging transit use;
- Mixed use includes shopping/retail areas, local neighbourhood scaled entertainment venues, community, recreational and other local facilities. Complimentary businesses such as shopping facilities are provided in commercial zones as well as in the commercial/residential developments in the core centers, regional centers and sub regional centers. A wide range of community facilities in the mixed-use group includes education, health, social welfare and recreation.

- **Implementing Agency:** RAJUK, DTCA, and Local Government Agencies.

OBJECTIVE-LDS 05: TO MAINTAIN THE INHERENT CHARACTER OF SPECIAL AREAS

A number of special uses, with extensive land allocations, are located outside the main urban area but within Dhaka's metropolitan region. These areas are included in the revised Structure Plan for special treatment. For a variety of reasons these Special Areas need to be considered to ensure that their respective sanctity and functions, and any future planned expansion, is secure and unimpeded from uncontrolled urban growth or encroachment.

DMDP Structure Plan (1995-2015) designated Special Areas includes:

- National Mausoleum Site;
- Savar Cantonment, Svar; and
- Government High Security Industrial Park, Gazipur;
- Biswa Estema, Tongi
- Lalbagh Fort in Old City;
- Hazrat Shahjalal (R :) International Airport;
- Savar Radio Transmission Center

Proposed Special Areas are as follows:

- Hajiganj Fort, Narayanganj;
- Sonakanda Fort, Kadam Rasul;
- Ahsan Manjil, Sadarghat;
- Murapara Jamindar Bari, Rupganj
- Bhawal Palace, Gazipur;
- Bhawal National Park, Gazipur;
- Kabipur Radio Transmission Center;
- Kashimpur Jamindar Bari;
- All KPIs;

Policy: LDS/5.1- Keeping the Areas for Special Treatment

The purpose of the special areas is to establish special zones which contains elements of the nation's or city's civic, aesthetic, cultural, historic, social, political and architectural heritage. The intent is to maintain, conserve and protect the integrity of these special areas and or sites, and where they exist to preserve and enhance their park like setting. The Plan will respect the integrity of the functions of the Special Area designations and maintain the land areas of their respective domain free from urban incursions.

- **Strategic Action:**

- The national or metropolitan importance and / or security of the functions of the Special Area designated sites requires that they be accorded special consideration, both in respect of prospective land use within their immediate vicinity and of future land requirements to sustain their particular functions;

- **Implementation Tools:**

- For the established Special Area activities, the establishment of **ad hoc Liaison Committees**, the RAJUK and respective agencies to monitor their respective future special operational requirements, and to adjudicate on development proposals within one kilometer of designated Special Area boundaries;
- Constraints or conditions imposed on development adjacent to Special Area sites would derive from security and/ or environmental consideration;
- Biswa Estema has special significance, but no specific restrictions need to be applied to the area surrounding it;
- Lalbagh Fort, Hajiganj and Sonakanda Fort, Kashimpur and Murapara Jaminderbari, etc. establishments where any kind of development within a radius of 250 meters from any such structure or area must be subjected to Special Project Permit from the relevant committee;
- All development on building heights in proximity of Airport for the landing and take-off of aircraft will be followed as per guidelines of Aviation Authority; There are several height restriction zones for these airports imposed by the Civil Aviation Authority Bangladesh (CAAB) for the purpose of ensuring safety of air traffic. Since these zones pose control on the vertical development, they must be included in the DAP for development control purpose. Height restrictions in Approach and Take-off Climb Surfaces in Funnel Area, Transitional Surfaces, and Inner Conical Surfaces vary with distance from the runway;
- All development within 183m (600 feet) of the Radio Transmission towers will be restricted;

- Key Point Installations (KPIs) are such organization/industries/public welfare structures that are designed by the Home Ministry as critically important from national defense capability and economic point of view. Special permission/NOC will be taken from respective authorities before any kind of development surrounding Listed KPIs;
- No buildings are allowed within an 800 meter (1/2 mile) radius of the National Mausoleum except those which serve an accessory to the Mausoleum, the area is to be preserved as open space and green belt. The permitted uses are:
 - Public uses and structures, includes libraries, base yards, public schools and post offices etc ;
 - Religious uses and structures;
 - Road/Railway/Utility ROW;
- **Implementing Agency:** RAJUK, City Corporations, Pourashavas and respective Agencies.

4.6.3 Policies for Each Strategic Management Areas

a. Central Urban Area (CUA)

While some parts of the Dhaka city are glistening with fancy modern stores and villas, yet in another part of the city - inner city core, the quality of life is severely deteriorated. It is due to very high population density, poor accessibility, and inadequate utility and infrastructure services. The existence of incompatible and hazardous land uses often make the area vulnerable for healthy living and require serious consideration for selective redevelopment scheme. Therefore, the development management options in the CUA are multi-faceted and need to be well coordinated. DMDP structure plan policy for urban neighborhood action programme (Policy-UA/4) can be used simultaneously in designing and implementing the 'redevelopment schemes'.

OBJECTIVE-LDS 06: TO REVITALIZE OLD DHAKA

Streamlining old Dhaka area through a careful package of relevant policies will revitalize the amicable ambience of the area as well as its traditional economic activities to make the city's economy more vibrant. Improving or rehabilitating the Buriganga riverfront is also necessary to make the revitalization efforts successful.

Policy-LDS/6.1: Revitalize the Old Dhaka through Selective Redevelopment, Rehabilitation and Preservation of Traditional Heritages.

- **Strategic Action:**
 - Prepare a detailed rehabilitation scheme for Old Dhaka including areas for redevelopment and areas for preservation.
 - Together with relevant government bodies, prepare plans for improving the Buriganga riverfront.
 - Consider vertical expansion while carrying out urban renewal to reduce plot coverage and increase open space. consider, along with any vertical expansion, the additional need of facilities and services;
 - Consider designating 'car-free' pedestrian district to enhance tourism.
 - Relocation of Central Jail should be expedited to provide land much needed for open space and development. A study should be made on the best use of the area (**See BOX-4.3**);
 - Immediate action for the implementation of Bukland embankment development as a recreational center is required in Sadarghat;
 - All the historical building including the Armenian Church, Dhakeshwari Mandir, and Christian Cemetery of Old Dhaka should be preserved as heritage sites. Conservation to be organized as part of an overall tourism development plan for the central part of Dhaka;
- **Implementation Tools:**
 - Take up programme and projects to widen existing roads and create new link roads to open up congested areas.

- Adopt 'conservative surgery' approach during redevelopment so that the heritages of old Dhaka are retained.
- Utilize the technique of TDR for preserving the historic districts and structures (refer BNBC)
- Redefine land use zones, when necessary, to enable traditional economic activities.
- **Implementing Agency:** RAJUK and Dhaka City Corporation.

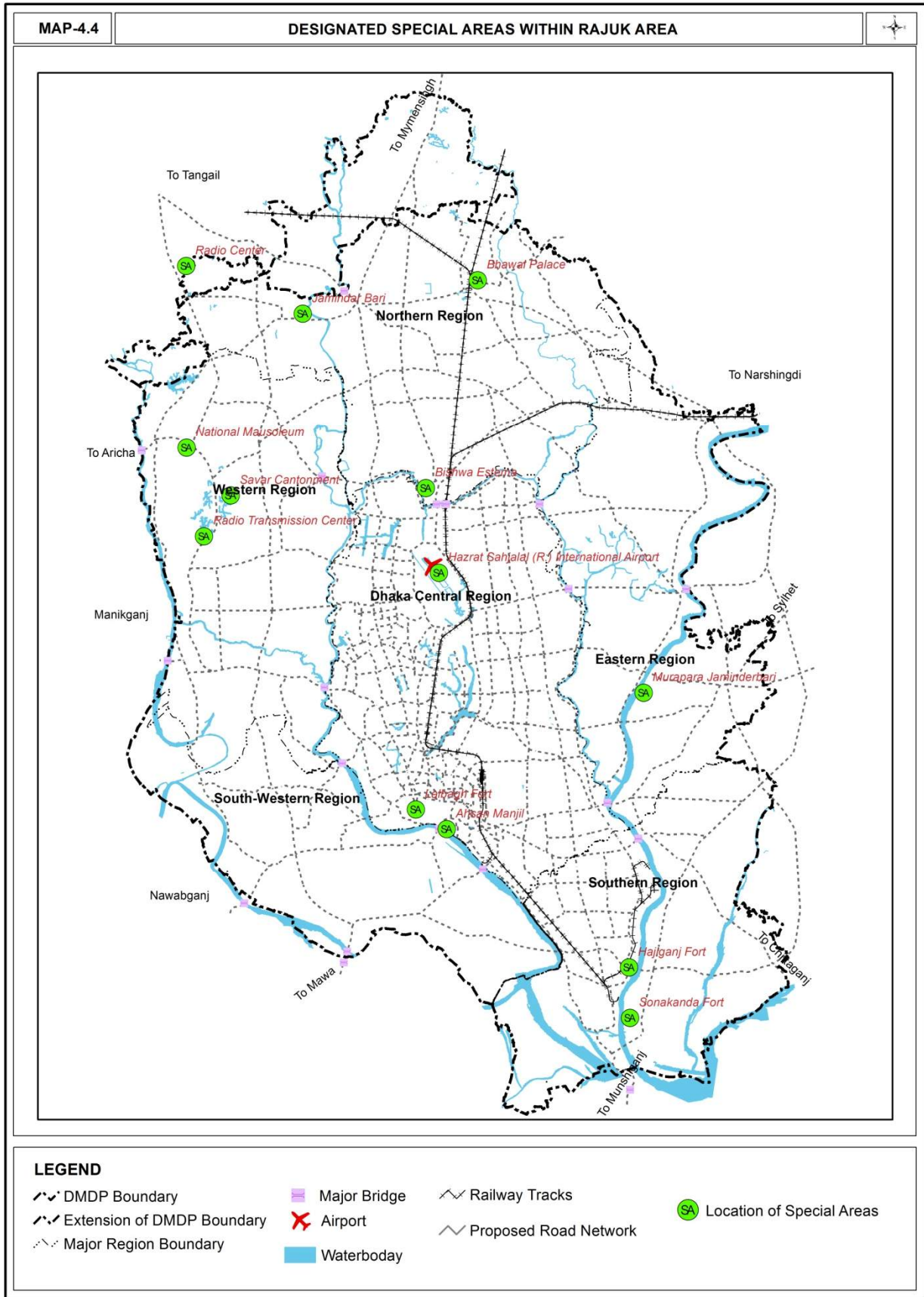
OBJECTIVE-LDS 07: TO MOBILIZE THE UNDER-UTILIZED LANDS WITHIN THE CITY

Within the Dhaka city, there remain sizable amounts of under-utilized land. Considering the scarcity of buildable lands in this ever-growing metropolis, it is very important indeed to make best use of available resources. Also, due to the government policy as well as the structural changes in land use, some areas have lost their values over time and not conforming to the surrounding. They all deserve close attention in the light of the maximum utilization of the available resources.

Policy-LDS/7.1: Recast and Improve the Land Use of the Under Utilized Areas

Within the inner-city, there exist a number of critical locations which once played critical roles in the growth of city's economy and social change. Faced with the fast changing perceptions and circumstances, both domestic and global, these areas have lost their competitiveness and have become the target for other usages rendering them underutilized. These places deserve restoration and improvement to enhance their utilization.

- **Strategic Action:**
 - Rigorous redevelopment or rehabilitation plan for these areas by RAJUK are necessary;
 - Seek possibility of PPP with private sources of fund for project implementation;
 - Re-densification of existing low-density areas of central urban area.
 - Implementation Tools:
 - Expedite the relocation of the Hazaribag tannery industrial complex to Savar, and prepare redevelopment plan of the previous site for use by environmentally-friendly activities(See **BOX-4.4**);
 - Consider an area-wide redevelopment plan for the Tejgaon industrial area. Upgrading into a CBD-like commercial district is a possibility.
 - Infrastructure provisions in Gulshan, Banani, Baridhara and Nikunju can support further densification;
 - Prepare revised landuse plan of Gulshan, Banani and Baridhara area;
 - Prepare revised landuse plan of Uttara, Nikunja and Joar shara area;
 - A detailed plan is required to guide the Karwan Bazar development into a commercial/business center for the city;
 - A detailed plan is required to promote planned development in Baunia of Mirpur and Kamragir Char area;
 - Detailed plan for Dhanmondi to define and provide upgraded/rehabilitated utility services is required in view of densification;
 - Bangladesh Secretariat will continue at its present site. It is easily accessible from all corners of the city and is capable of serving more years to come. If shifted the complex could be used by various government departments using rented housing;
 - Adequate measures are required to prevent further filling and reduction in size of Gulshan Lake, so as to maintain its effective function and develop it as a center of recreation;
 - A detailed Plan is needed for Mirpur Ceramic site to re-develop the area in a planned way;
- **Implementation Agency:** Related Ministries, RAJUK and Local Government Agencies.



Policy-LDS/7-2: Shifting of Cantonment and Military Facilities from the City Center

There have been repeated remarks that these facilities are seriously distorting the city's urban fabric in many ways. DMDP explicitly recommended policy for relocating the cantonment to outer location, but never implemented at all. It still deserves even more serious attention. Apart from occupying valuable urban lands at prime locations, frequent witness of military presence is simply not very desirable in a modern metropolis.

- **Strategic Action:**
 - Government cabinet should seriously discuss on the issue and take decision.
 - Relocate the Dhaka Cantonment to outside the RAJUK area.
- **Implementation tools**
 - Consider relocation of other para-military facilities like BGB for outer locations also.
 - No more permission of DOHS in the city's prime residential locations.
- **Implementation Agency:** Ministry of Defense, Ministry of Home and Affairs, RAJUK.

Box-4.3

Making Effective Use of Central Jail Land

Dhaka Central jail is located at a strategic position of the city, in between old and new Dhaka. This is about to be shifted to Keraniganj soon, vacating a large area of land for alternative uses. We believe this land should be handled very carefully and judiciously. Now what possible uses it can be put into? DMDP recommended the area for open space and other developments. We strongly side with DMDP idea. Old part of Dhaka is highly lacking in breathing and recreational open space. It is a crying need for old Dhaka. Amid scanty supply of land this place is the last opportunity for providing open space for old Dhaka. We recommend at least two thirds of the land of the old Central Jail should be put to open space as park and play fields. Rest of the area may be used for other development purposes that may include cultural and public assembly facilities etc.

Box-4.4

Regenerating Brownfield of Hazaribagh Tannery Area

Leather processing is one of the oldest industries in Bangladesh. About 95 percent tanneries of the country are located at Dhaka's Hazaribagh area. The toxic pollutants generated by these tanneries have severely polluted not only the soil of the area but also water of the Buriganga River. The land use characteristics of the leather zone are dominated by leather processing industries interspersed by low and middle income residences. The area is characterized by very little open space, inadequate and zig zag roads, absence of adequate public transport. Steps should be taken immediately to regenerate the area through preparation and implementation of an Action Plan which will be eco-friendly, pedestrian and NMT friendly, public transport oriented and mixed land use development. Attempt should be made to retain existing alignment of the road network as much as possible. It should provide open space and straighten and widen the existing connecting roads with the peripheral primary roads and thus regenerate Hazaribagh as an attractive livable place in the city.

b. Outer Urban Area (OUA)

Most of the proposed regional centers are located in this outer urban area which will be developed as self-containing urban community with employment opportunities and everyday living amenities (schools, hospitals, shops, parks & open space and community facilities). Ample green and open spaces need to be secured between these centers and also between them and Dhaka to create comfortable and relaxing community ambience for the residents. To promote intense development beyond core city boundary, following strategies can work as pragmatic approach. Necessary key infrastructures have to be preceded, of course, prior to substantial developments. Incentive or bonus zoning is a kind of 'planning tool' that allows a planning authority to grant a bonus, usually in the form of additional density or the intensity of the development, in exchange for amenities that is required by planning authority for greater social welfare. To realize growth options like 'decentralized concentration' and TOD, RAJUK has to consider such incentive schemes to encourage developments in the desired locations. It is also in line with the critical transportation policy of Mass Transits and Ring Roads (**Policy-TRANS/1.2** and **Policy-TRANS/2.1**) which is expected to link all the regional centers, as well as the major radial roads connecting them with the city center.

OBJECTIVE-LDS 08: TO EXPEDITE DEVELOPMENT IN THE OUTER AREAS

Development in the core Dhaka city quickly is getting saturated as evident by slow growth rate. To accommodate new migrants and those moved from the city core, it is necessary to expedite development in the outer areas. It is essential that it has to be preceded by development of infrastructure and services.

Policy-LDS/8.1: Initiate Early Provision of Essential Infrastructures to Attract Potential Residents towards Regional Growth Centers.

It is necessary to ensure adequate infrastructure provision in the substantially urbanized areas. For the potential new development areas accommodating the population relocating from Dhaka city core, Planning of key infrastructure should proceed in advance by the government sector.

(Related discussions are in Chapter 8, Policy-WAT/1.5 and Policy-WAT/2.1)

Policy-LDS/8.2: Encourage Private Sector's Voluntary Initiatives utilizing "Incentive/Bonus Zoning".

Incentive or bonus zoning is a slight variation of conventional regulations. Development proposals in the preferred or desired locations are allowed a higher level of building (e.g. 10~20% in FAR, MGC) than in other locations. Those preferred locations can be determined by the related government bodies reflecting the strategy for future growth of the community.

- **Strategic Action:**

- Adopt the method as a technique of development promotion in the policy.

- **Implementation Tools:**

- Legalize the concept incorporating either in TI Act1953 through by-law or in the BC Rules, and make use of it through undertaking development projects.

- **Implementing Agency:** RAJUK

c. Development Strategy for Growth Management Area (GMA)

The current and foreseeable land use intensity in the different parts within the RAJUK area warrants customized approaches. While the in-filling developments in the core areas should be allowed, only selectively, to build more in a compact fashion (recalling 'Land consolidation policy' in the DMDP Structure Plan), those in the outlying fringe areas need to be administered carefully so that adequate infrastructure provisions are ensured in a concurrent manner. Policy about

infrastructure development in growth management areas has been provided as **Policy-HN/1.1** in Chapter 06, Housing. To promote, control and manage growth in this area, following objectives and policies are to be attained:

OBJECTIVE-LDS 09: TO PRUDENTLY GUIDE THE DEVELOPMENTS IN GROWTH MANAGEMENT AREAS

As the Growth Management Area is going to be the primary location for future urban growth, it is of critical importance to properly guide and manage future urbanization in this zone. It is considered undesirable to allow the development intensity here as high as in the existing inner Dhaka city.

- Specifically, following directives should be taken into consideration:
 - Comprehensive infrastructure led systematic planning to manage and steer development for Eastern Fringe, Jinjira and DND area is required;
 - Immediate detailed plan/Action Area Plan is required to guide the development in planned way in Uttarkhan, Dakshikhan, Nalbhog, Kamarpara, Dhaur, Ranabholia, Donia area of Dhaka Central Region and Aminbazar, Hemayetpur, Banagram, Dhamsona, Birulia, Ashulia area of Western Region;
 - Konabari, Dhamsona, Ashulia, Bhulta, Zirani, Kadam Rasul etc area may be the suitable locations for future industrial agglomerations;
 - Setting up of noxious industries in Keraniganj should be prohibited to protect the environment of Old Dhaka as the dominant wind flow is south to north;
- And furthermore,
 - Potential areas of Growth Management Area (GMA), where intensive pressure of development in near future is inevitable, should be brought under adjacent City Corporation/Municipalities boundary to direct and manage fast development and densification process for example remaining parts of DMA could be included in DCC boundary);
 - Given its strong orientation to Dhaka and its large population, Jinjira should be given municipal status or be included in Dhaka City Corporation to provide basic services and foster development;

Policy-LDS/9.1: Guide Planned Development in Growth Management Areas

Growth Management Areas are the most potential areas for future urban development, which require efficient and proper initiative to guide the development in planned manner. The future of urban growth is indeterminate due to land market condition and changing policy of the government. It is difficult to control urban sprawl only by urban development planning which is largely directed by economic trend and infrastructure development. There exist good natural resources and economic conditions for urban development in these areas. New migrants from other districts mostly settle in these places because of high property value in the core Dhaka City.

- **Strategic Action:**
 - Optimize the utilization of land converted to urban use and to see to the development of appropriate and affordable levels of infrastructure;
 - Regulate premature urbanization by adopting Urbanization Control Zone (UCZ) concept in Growth Management Area (GMA);
- **Implementation Tools:**
 - Cluster Development technique may be adopted which involves clustering settlements in one area of the site while preserving the remainder of the site as open space. This process allows the developer to develop at a higher density than they might otherwise be permitted in exchange for the preservation of open space.
 - River/khal/lake front development projects could be taken to promote the development keeping the existing natural channels as sources of recreation;
 - The private housing projects located within the GMA should be permitted considering detailed hydrological modeling, Environmental Impact Assessment (EIA) and Traffic Impact Assessment

(TIA) etc. The recommendations of EIA and TIA should be followed during the implementation of housing projects;

- Provisions for gas, electricity and water supply in the area should be designed to such scale to enable to meet the demand from increased densification;
- Strict enforcement of plan recommendation and building construction rules.
- Earmark the land as Urbanization Control Zone which has very little possibility for immediate urbanization;
- Monitor development and take legal action against violators of plan provisions.
- **Implementing Agencies:** RAJUK, DTCA, WASA, City Corporations, Pourashavas, BGMEA, and BKMEA.

Policy-LDS/9.2: Differentiate upper limit of Maximum Ground Coverage (MGC) and Floor Area Ratio (FAR) between the Central Urban Area and the Rest of RAJUK Area

To check the excessively intense urban development in the future, it is suggested that applicable FAR and MGC outside the CUA be somewhat lowered (e.g. 80%). To induce the developments in desired locations (i.e. urban centers and transit nodes) however, bonus zoning can be made selectively to allow higher ratios (refer to **Policy-LDS/8.2**).

- **Strategic Action:**
 - Amendment of Building Construction Rules
- **Implementation Tools:**
 - Review the idea of increasing MGC and FAR in the outer zone among professionals.
 - Make necessary amendments in the BC Rules to incorporate the accepted idea.
- **Implementing Agencies:** RAJUK and Local Government Agencies.

d. Strategies for Agricultural Area

Despite the formulation of a policy in the existing DMDP (RS/1) to ensure urban food supplies in close proximity to the city, it could not be implemented because of overarching pressure of urbanization. In the current field survey, agriculture is still found to have the highest proportion of land in the RAJUK area, though about 7200 hectares of that earmarked as urban residential zone in DAP.

Facing the additional growth of 10million or more population in the upcoming 20 years, it seems rather difficult to keep these agricultural lands intact. At the same time, the supply of foods to the residents is also of utmost importance for any metropolitan government and so is the conservation of agricultural lands. Therefore, notwithstanding the inevitable loss of some agricultural lands for future urbanization, it is necessary that high-yielding prime agricultural lands be conserved as much as possible (**Map-4.3**). The Ministry of Agriculture should be the appropriate authority to designate 'prime agriculture land' in and around RAJUK area and take required initiative to protect them. Agriculture can further contribute to sustainability and well-being in cities, for instances, by increasing the area of permeable surface for storm water management, or reducing the heat-island effect by cooling the air. Agriculture can also contribute to biodiversity and ecosystem services by providing habitats and managing species.

OBJECTIVE-LDS 10: TO ENSURE FOOD SUPPLY

For the sake of food production, there is a need to conserve high-yielding agricultural lands against severely competing non-farm land uses. Following policy is recommended to protect agricultural land:

Policy-LDS/10.1: Take Necessary Actions to Protect Prime Agricultural Lands

Maintaining agricultural lands near Dhaka City area ensures a reliable supply of fresh, healthy food close to market where transport cost will be minimum, and will also reduce food miles (the distance that food must be transported) and even provide bio-energy resources like, properly managed forest areas. Agricultural lands provide important environmental benefits, for example, recharging of groundwater, as the level of groundwater of Dhaka City area is depleting gradually. Preserving the lands will help maintaining the soil health. Agricultural lands are important resource for recreation and well-being, including green spaces for personal leisure and spiritual comfort. Agricultural lands can serve as open space for disaster management, including fire spread prevention, evacuation space for earthquakes and in case of other disasters.

- **Strategic Action:**

- Undertake a study on improving urban climate through greening of built environment and promoting agriculture;
- Delineate important agricultural lands within RAJUK area in Structure Plan and Detailed Area Plan (Please see **Map-4.3**).
- Some form of compensatory measure needs to be devised for the landowners of designated prime agricultural lands.
- Designated Flood Flow areas will be used Agricultural lands in dry season;

- **Implementation Tools:**

- Enforcement of land use provisions under Revised Structure Plan and Detailed Area Plan (DAP).
- Maintain strict monitoring and vigilance against violation of the land use plan.
- Initiative can be taken for promoting different farming programs (**Agricultural and Industrial complex**) in designated agricultural land, like market garden, vegetables, farm production, orchard, and sustainable technologies.
- Conversion approved only where the pressure is severe for change on national interest.

- **Implementing Agency:** RAJUK, Ministry of Agriculture, Local Government Agencies, and Department of Environment.

e. Conservation Area Strategy

Land conservation helps to shape the urban form. Greenway, green infrastructure and ecological network represents the strategies of smart conservation which promotes resource planning and protection in a way that is proactive not reactive; systematic not haphazard; holistic not piecemeal; multifunctional not single purpose; multi-jurisdictional not single jurisdictional; and multiple scale not single scale. (Benedict, 2002)

Conservation Area is already defined for RDP in the previous section. Any kind of development should not be allowed in this area except agriculture and some low impact recreational activities. DMDP structure plan policy related to 'Flood Flow Zones' (RS/53), 'Flood Retention Ponds' (RS/5) and Policy-LDS/4.1 of RDP can be adopted for conservation area of Structure Plan area. To actively protect the essential water bodies, some restrictive measures should be applied in the areas directly affecting them.

In order to conserve vulnerable wetlands from undesirable greedy encroachments, and also to ease the financial difficulties of the owners of those lands, 'pre-emption' scheme need to be deployed by the appropriate government body. Before any transactions take place in those wetlands, governments are given the right to intervene and exercise the priority purchase power. Necessary legislation should back up the scheme. Purchased wetlands can be held up for long-term conservation in the form of public land banking for possible future use.

OBJECTIVE-LDS 11: TO PROTECT CONSERVATION AREAS

Protection of conservation area is imperative to conserve environment, biodiversity, nature and protect life and property from natural disasters. The concept of ecological infrastructure (EI) can be adopted for safeguarding natural environment of RDP area. EI is composed of critical landscape structures that are strategically identified and planned to safeguard the various natural, biological, cultural and recreational processes across the landscape, securing natural assets and ecosystems services, essential for sustaining human society. It functions as a framework for urban growth and indicates where should not be developed.

The following policies have been formulated to implement the objective.

Policy-LDS/11.1: Consider “Special Conservation Zone” with Stricter Regulations to Protect Rivers and Khals.

Rivers and khals have to be protected with all necessary measures to safeguard built up areas from flooding (**Policy-DH/2.1 under Section 8.4 Drainage and Hydrology in Chapter 8 details out the issues of implementing the policy**).

Policy-LDS/11.2: Enact Pre-Emption (Priority Purchase Right by Government) for Transactions within Flood Flow Zones and Water Retention Areas.

This measure will promote public interest for preserving flood flow zones and regulating undesirable transaction to the developers.

- **Strategic Action:**
 - Policy decision and enactment of necessary legislations to enable pre-emption
 - Secure revenue to carry out priority purchase when needed.
- **Implementation Tools:**
 - Necessary regulation may be framed under Town Improvement Act 1953.
- **Implementing Agencies:** RAJUK, Ministry of Agriculture, and Department of Environment.

CHAPTER 05 TRANSPORT FOR EFFICIENT CONNECTIVITY



CHAPTER 05

TRANSPORT FOR EFFICIENT CONNECTIVITY

5.1 Introduction

Comprehensive and efficient transportation systems with good inter and intra city linkages are essential to ensure Dhaka's position as a modern city and to serve the administrative, financial and commercial capital of the country. The city must be able to provide an efficient and equitable transport infrastructure which will allow all members of the community equal access so that everyone can enjoy the maximum benefits of city life. Current chaotic transport system of the city is causing huge socio-economic losses which can become a major handicap to the national development by losing competitiveness in the world. The current Chapter of the Structure Plan Report analyses the current transport problems of the City and makes policy proposals for a fully integrated multimodal transportation system integrating all the metropolitan region urban centers for coming days.

5.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of Transport system of Dhaka City Region.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • High rate (about 20%) of pedestrian traffic. • Strong private sector involvement in transport sector. • Adequate number of passengers to support mass transit. • Existence of circular waterway around Dhaka City. 	<ul style="list-style-type: none"> • Railway line passing through the heart of the city. • Scope of transport network development in the sub-urban area. • Provision of Transit Oriented Development (TOD) along Mass Transit Stations may promote compact development; • Promotion of compact development will reduce travel demand;
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Absence of Mass Transit facility. • Absence of continuous east-west connectivity in the core city area. • Absence of Ring Road to diverse traffic which has no business in the core city area. • Absence of updated technology to reduce traffic congestion for smooth movement of traffic; • Mismanaged traffic system. • Poor Public transport system, including bus services; • Absence of adequate parking facility. 	<ul style="list-style-type: none"> • Huge growth of population leading to growth of vehicular traffic and congestion. • Uncoordinated development of flyover and expressway. • Failure to timely development of sub-urban connectivity. • Overconcentration of population in the core city area. • Increasing cost of development of transport infrastructure.

5.3 Scenario Analysis

5.3.1 Regional Importance and Linkage

Dhaka is well connected with the rest of the country by air, road, rail and river. Average daily passengers entering and leaving the city is about half a million (Table-5.1). On average they generate at least two million trips a day which is about ten percent of the total daily trips generated in entire Dhaka city. With decentralization of economic, administration, health facilities, and higher education much of these travels could be minimized relieving pressure on travel demand in core Dhaka.

Table-5.1: Daily Passenger Movement in Dhaka (Estimated)

Terminals	Number of Routes	Number of Daily flights/Trips	Number of Daily Passengers (Arrival and Departure)
International Airport	37	160	15,000
Kamlapur and Tongi Railway Station	39	101	120,000
Sadarghat River Terminal	45	404	170,000
Gabtolli Bus Terminal	30	960	50,000
Mohakhali Bus Terminal	8	410	20,000
Saidabad Bus Terminal	19	790	35,000
Fulbaria Bus Terminal	5	1000	32,000
Total			442,000

Source: RDP Survey, RAJUK, 2013

There is also huge freight transport movement from and to Dhaka due to location of railway and river ICD (catering to the needs of two EPZs and many industries located in DMDP area) within the city, and a major whole sale market. Much of the freight transport movement within the main city can be reduced with relocation of industries outside Dhaka and decentralization of wholesale trade activities. There are only four access links to Dhaka city, and because of absence of access controlled arterial road/bypass, entry and exit to Dhaka becomes a nightmare (sometime it takes three to four hours).

5.3.2 Modal Share

From the mobility analysis, carried out recently by the consultant of Dhaka Bus Network Study (under DTCA), it has been observed that on an average working day about 21 million trips take place in the planning area. High mobility need is due to high population density (45000 persons per sq.km).

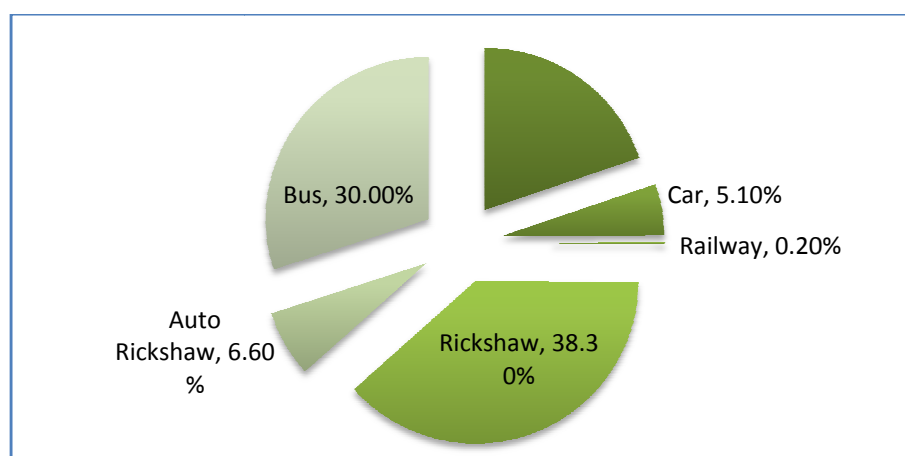


Figure-5.1: Distribution of Modal Share

The average length of bus trip is 5.6 km, and rickshaw trip is 2.1 km. It is expected that by 2035 modal share of public transport will increase significantly whereas modal share of rickshaw trip will decrease to 20%. Out of all trips taking place each day, trips to school constitute 17.7%, to home 12.6%, and to work is 44.7%.

5.3.3 Public Transport

In RAJUK area, there are various public transport modes such as public bus, auto rickshaw, taxi, rickshaw, Railway, Waterway, as shown below in **Table-5.2**:

Table-5.2: Classification of Public Transport Systems

Classification		Mode
Road-based Public Transport	Motorized	Public Bus, Auto Rickshaw, Taxi
	Non-Motorized	Rickshaw
Rail-based Public Transport		Bangladesh Railway (BR)
Water based Public Transport		Ferry, Boat

Source: JICA Study Team, DHUTS, DTCA

a. Bus Service

The current bus network serves a population of 5.5 million everyday (considering an influence zone of 400 m of the transport network) through a road network of 3,800 km in the study area which represents a road density of 3.65 km per sq-km. However, several local streets in old part of city and some new unplanned neighborhoods are too narrow (where rickshaw movement dominates) for bus operation, resulting in only 12.5 percent of the entire road network suitable for bus movement. In the study area most of the high capacity roads run north-south. Out of 152 bus routes only 5 bus routes operate east-west.

The existing public transport culture creates a low quality service, adding to road congestion and having negative social impacts. The reasons are,

- Multiple, uncoordinated and weakly regulated bus operation;
- Significant disregard to passenger safety and comfort;
- Lack of safety and respect for female passengers, and;
- Non existence of adequate infrastructure (bus stops, dedicated lanes, and depots);
- Disregard to the rules and regulations by the bus drivers;
- Incapable and non-professional attitude of drivers;

Congestion increases the average trip times which results in higher fuel consumption. The current bus fleet is not environment friendly; about 82% of the buses are diesel fueled due to which air pollution is five times the acceptable limit.

b. Taxi Service

Taxi is an important element of urban public transport system offering a convenient form of alternative transport particularly during off peak hour time. Dhaka is probably the only capital city in the world having extremely limited provision of taxis. Taxi service started in Dhaka in 2004 with 2000 taxis, but due to lack of incentive by the government most of the taxis went out of service within a very short time. Last year about six hundred new taxis have been put in the Dhaka streets by two companies. However, the fair is not within affordable limit of the majority of the city dwellers.

c. Auto Rickshaw and Tempo

There are about 13,000 registered auto rickshaws and tempos in the city. Currently, there is a ban on new registration which caused plying of illegal auto rickshaws on the streets; as a result the actual number of this category of vehicle is much higher (2000-3000). These vehicles use CNG as fuel which is environment friendly. Though there are meters in the vehicles, the fare is actually determined on bargain. However, the fare is not affordable by low income groups. People's dependence on auto rickshaw will continue until an efficient public transport system is introduced.

d. Railway

Within the main city Railway (BR) operates from two major stations, Kamlapur Railway Station (Central Station) and Airport Railway Station (North of Central Station). The railway network of Dhaka passes from central railway station to Narayanganj in south-eastern part and in the northern part up to Tongi junction. From Tongi junction, one section goes through Narsingdi towards Chittagong and Sylhet other section goes up to Joydebpur and from there, one line goes to north Bengal via Jamuna Multipurpose Bridge through Tangail and another line goes to Jamlapur via Mymensing. Through these three directional lines Dhaka is connected with the entire railway system of the country.

e. Waterway

The Sadarghat terminal is the only major river terminal on Buriganga River that connects river traffic of the south-western Bangladesh to Dhaka city. The major inter-district passenger routes connect Dhaka to Khulna, Barisal, Bagerhat, Pirojpur, Patuakhali, Chandpur, Bhola mainly the southwestern region of Bangladesh.

BIWTA planned a circular waterway service of 110 km surrounding Dhaka City along Buriganga, Turag, Balu, Shitakhya River. The 1st phase of the service of 29 km is running from Sadarghat to Ashulia with 6 landing stations. The remaining length is still under preparation with river dredging for navigation and landing stations. The current water bus roject from Sadarghat to Ashulia is facing some problems as stated below:

- No feasibility study was done before launching the project;
- No operational plan was made for the service;
- Landing station facilities are not good enough;
- Huge traffic jam en route to reach terminals in Sadarghat and Gabtoli;
- No feeder bus services provided for water bus network; and
- Very low publicity for the service.

5.3.4 Private Transport

- a. **Car:** As ascertained from BRTA the number of registered car (including jeep and microbus) in Dhaka is 306,000 with average annual growth during last five years varied between 5% to 10%. The growth is very much dependent on import duty. The current contribution of trip by private car is about 5%, even with higher economic growth this ratio is not going to exceed beyond 8% by the year 2035 due to the introduction of MRT/BRT and improved bus system.
- b. **Motorcycle:** Motorcycle population is increasing more than 10% annually. The registered motorcycle in Dhaka till 2013 is 3,04,000 out of which 50% may not be in use due to old age. The motorcycles are usually on the street during morning and evening peak hours. As observed in other developing countries, their number may increase rapidly in the next few years increasing the risk of air and noise pollution, and the risk of road accident.

5.3.5 Non-Motorized Transport

- a. **Rickshaw:** Manually operated rickshaw is a prominent mode of transport for Dhaka city. There are about 5,00,000 rickshaws in Dhaka City contributing 37% of the total trips, and providing jobs to about a million people (in two working shifts). Due to their presence in arterial and main roads the speed of motorized vehicles reduces to only 8 km/hour during peak hours contributing to severe traffic congestion.
- b. **Pedestrians:** Presently, about twenty percent of daily trips (especially short length trips) are walking trips. Most of the CBD area and public utility (education and health) areas are provided with sidewalk of varying width (1m-4m) covering 600 km in length. However, most of the sidewalks in CBD area are occupied by vendors forcing the pedestrians to take to the carriageway, thereby creating traffic congestion and safety hazard. Some of the residential areas are provided with sidewalks but newly built areas lack this facility

5.3.6 Freight Transport

The impacts of freight traffic on urban roadway are a major concern in RDP study area. The movement of the goods or the freight traffic is necessary for keeping business going on and transportation of consumer goods at economical cost. It is estimated that about 70% of containers passing through the Chittagong port are known to originate from or are destined to Dhaka and Narayanganj areas. The Chittagong port handled about 16 million tons (1.5 million TEUs) of cargo in 2013 (source: CPA). About 11 million tons of cargo passes through Dhaka and Narayanganj mostly by roadway (85%). All of this traffic has to use the only Dhaka-Chittagong highway to pass through capital city by trucks and trailers.

5.3.7 Transport Infrastructure

a. Roadways

Out of about 4167 km of paved road, only about 500 km is of primary standard and suitable for bus operation. As found from physical feature survey, the total road length of different categories of has been shown in **Figure-6.2**. However, there is **no access controlled arterial road and/or ring road** around Dhaka, as a result, entry to and exit from Dhaka usually takes several hours.

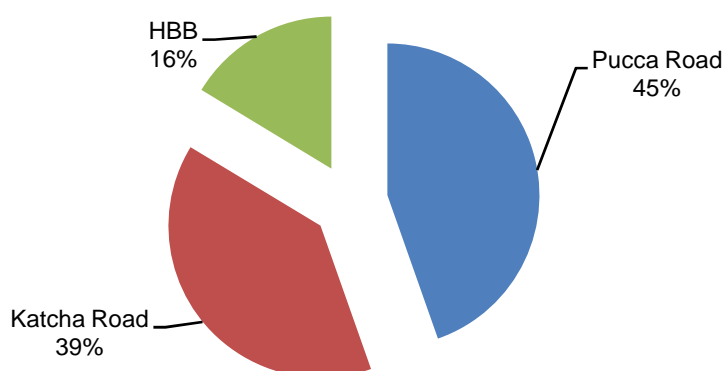


Figure-5.2: Distribution of Existing Road Network of RDP Area

Source: RDP Physical Feature Survey

b. Bus Terminals

Three inter district bus terminals (Gabtoli, Mohakhali and Saidabad) provide some facilities of interchanges from inter district buses to city buses. The existing bus stop facilities are also ineffective due to presence of vendors. Many of the intercity routes overlap with city routes creating problem for bus route planning.

The major identified concerns are connectivity with the terminal, passenger facilities, parking condition and the overall traffic condition in the access roads.

c. Railway Terminals

There are four major railway stations in the RDP area. These are, Tongi, Kamalapur, Gazipur and Narayanganj. The major findings from the railway terminals and stations are provided below:

- Availability of Railway ticket is a major concern for the passengers;
- Passenger facilities are in a very poor state in most of the terminals;
- Car parking space is not sufficient, while parking areas are occupied by temporary vendors;
- Tejgaon, Tongi and Pubail Railway stations are not well connected to feeder services; and
- Narayanganj Terminal functions as a part of Multimodal System.

d. Waterway Terminals

There is approximately 40 km of waterway within DMA area with 13 inland waterway terminals on the banks of Buriganga, Shitalakhya, Turag and Balu River operated by Bangladesh Inland Waterway Transport Authority (BIWTA). From the point of importance, as a major connecting gateway Sadarghat and Narayanganj waterway terminals play an important role. Both the terminals are used for passenger and freight transport.

The major findings from the terminals/stations investigation are:

- There is lack of road linkage to the waterway passenger terminals due to which passenger movement is restricted;
- The capacity of the access roads is not enough to accommodate the huge passenger traffic;
- No specific parking space available around terminals;
- Available passenger' facilities are in extremely poor condition;
- Poor public transport connectivity to the terminals;
- Goods handling is done manually, which is time consuming;

e. Truck Terminal

Currently, the infrastructure available for freight transport in and around RDP area is quite low for efficient goods movement. From visit to terminals and interview with the drivers and helpers, it was revealed that the facilities available for the goods handling and truck operation is very poor. All the terminals depend on the manual loading and unloading which takes longer time. There are very limited resting, accommodation and basic facilities available for the truck drivers and helpers.

f. Inland Container Depot/Terminal

Globalization has led to industrialization and increased import and export leading to dramatic increase in container handling in Chittagong and Mongla ports. Freight traffic is expected to register further rise with the increasing economic activities. Railway has limited capacity in handling container. Inland Container Depot (ICD) at Kamalapur and flat carriages, shares only 10% of the container transport. The Pangaon Container Terminal has started commercial activities in 2013 with total capacity of 30,000 TEUs by waterway from Chittagong thus relieving some pressure on Dhaka-Chittagong highway. The major obstacle is to attract the shipping companies to bear the extra expenses (cost of loading-unloading at Chittagong and Pangaon) to bring containers to Pangaon. The river route from Pangaon to Industrial areas also requires regular maintenance and affordable services.

g. Airport

Hazrat Shajalal International Airport in Dhaka is the largest airport in Bangladesh connecting the world and handling about 66% of international and domestic flights of the country. According to the CAAB, it handled 5.6 million passengers and 214,000 metric tons of air cargo in 2012. The total capacity of the airport is 8 million passengers and is assumed to reach its saturation level in 2026. The vehicular access to/from the airport requires immediate attention and long term solution.

A feasibility study is underway to decide about adding a parallel, second runway at a cost of Taka 10 billion. The project has been taken to cope with the rising air traffic, and take pressure off the lone runway, to double the capacity of the airport. CAAB predicts that HSIA's traffic will surpass 10 million passengers and freight. Currently, the airport can handle 10 flights per hour, 1 every 6 minutes. However, 60% of the airport's 2000 acre land remains underutilized. (Source: CAAB)

h. Vehicle Parking

There is a lack of parking space for vehicles in the commercial/business districts in Dhaka City. With new building code and better understanding of the parking demand, the newly built buildings are equipped with parking spaces. Three new multistoried parking facilities have been created in Gulshan-1, Gulshan-2 and in Dilkusha areas. However, they are found highly inadequate compared to the parking demand in the city.

5.3.8 Projected Travel and Traffic Demand

The values in the **Table-6.3** show trip production by each trip purpose. All-purpose trips will increase gradually in the future with trip “To Work” and trip “To Home” always being dominant.

Table-5.3: Population Trip rate by Trip Purpose in RAJUK Area

Year	Total trip (1,000 trips)	To Work	To School	To Home	NHBB	Private
2013	29,580	17.74%	12.59%	44.73%	11.07%	13.87%
2015	32,595	17.81%	12.70%	44.88%	11.16%	13.45%
2025	45,540	18.04%	13.00%	45.33%	11.43%	12.20%
2035	54,340	18.15%	13.15%	45.55%	11.56%	11.59%

Source: Compiled by Consultants, 2014

The trips by mode will increase steadily in the future particularly car and bus trips will increase significantly whereas rickshaw trips will reduce significantly.

Table-5.4: Present and Future Trip Rate By Each Mode (Unit: %)

Year	Total trip (1,000 trips)	Car	Bus	Rickshaw	Etc	Railway & Harbor	Walk	Total
2013	31,355	6.43	34.15	40.58	0.12	0.21	18.51	100.0
2015	34,877	7.22	36.97	37.69	0.14	0.25	17.72	100.0
2025	46,639	11.12	41.78	30.90	0.19	0.33	15.69	100.0
2035	59,774	16.29	41.46	27.37	0.20	0.34	14.35	100.0

Source: Compiled by Consultants, 2014

During next 20 years there will be substantial increase in population, number of vehicles, and number of trips for Dhaka which will increase traffic congestion and reduce traffic speed at peak hour (from 8 km/hour at present to about 4 km/hour by 2035).

5.4 Critical Issues

a. Poor Public Transport System

As the Dhaka metropolitan area grows to its future targeted population of over 26 millions, there will be increased demand for public transport service. An efficient, safe and reliable public transport system including bus and mass rapid transit services which the general public can afford to use will be required to transport people to work and in their leisure pursuits. Public transport is not comfortable and easy in Dhaka, particularly to women, children or elderly people due to poor accessibility and non-integrated transport network. Local buses have no defined stoppage facility along its route and they use total road width to board passenger, which cause multiple number of obstacle in flow path. The National Land Transport Policy which was adopted in 2004, in its section nine stated that the bus service and pedestrian would be prioritized and commuter services would be introduced. If public transport is not given more priority over other vehicle types and road users, the goal of attaining smooth traffic flow will remain unfulfilled.

b. Lack of Coordination Among Government Agencies

The transport network and facilities of RAJUK area are owned and operated by different government agencies under different ministries. There are also several city corporations and pourashavas within RDP. Dhaka Transport Coordination Authority (DTCA) was formed in April 2001, to function as a coordinating body among agencies for transport related activities. Due to lack of superior authority over agencies, DTCA can't play its proper role as envisioned during its formation. Due to this lacking, many well planned projects cannot be implemented/ completed on time which indeed has adverse impact on the overall traffic situation.

c. Traffic Congestion

Inevitably Dhaka faces unbearable traffic jam. With present vehicular growth (over 10%), unplanned development, non-compliance and a poor mix of land uses the city traffic flow is headed towards an ever halted situation. In a congested road, drivers generally compete with aggressive attitude to occupy limited front space within a glimpse. This will lead to dreadful situation that is prevailing in Mexico City, where 20% of workers spend more than 3 hours traveling to and from work place every day, and 10% people spend over 5 hours (Habib, 2002). Passenger travel time is stretching to such limit where national economy is suffering due to loss of hours on the congested road. In Dhaka, the traffic congestion cost is US\$3 billion a year and the city losses over 8 million working hours daily (Osman, 2011). Like many other cities in developing countries, Dhaka is struggling with the serious problem of existing traffic stop-and-go situation. Recently, Urban and Regional Planning Department (URP), BUET has carried out a study, which shows that the city losses over 5 million working hours daily due to traffic congestion.

d. Presence of Rickshaw in Major Road Corridors

Rickshaw cannot be considered as low cost transportation as it costs highly per kilometer than public transport. Road standards are required to properly identify, design and prioritize maintenance of roads. There are about 100,000 registered rickshaws in Dhaka city, while the actual number of rickshaws in operation is around 500,000. Due to missing of separate rickshaw lane, the mixture of rickshaw and Motorized traffic reduces overall capacity and vehicular speed on roadways. A better alternative of rickshaw is required to provide services for the rickshaw-users.

e. Absence of East-West Continuous Road

In the city, there is not a single continuous main road in east-west direction. The roads which are existing in this direction are all connecting roads or link roads. For discontinuity of the roads, huge number of T and staggered junctions develop on the layout of the city. So, vehicle cannot move thoroughly in east-west direction. Absence of east-west connection has become the major problem for the entire road network of Dhaka city. Presently, such requirements are met by relatively narrow and poorly aligned roads, which are far highly inadequate to meet the existing demand in terms of capacity, speed and level of service.

f. Insufficient Parking Facilities

Dhaka suffers from parking problems due to inadequate parking facilities, both on-street parking and off-street parking. In Motijheel commercial area which is the central business district of the city, becomes heavily congested during peak hours. Vehicles are parked all along the street, that often are double and triple-parked. Other major business centers also possess similar problems. Insufficient parking facilities at shopping centers have remarkable impact on traffic flow in adjacent roadways. Illegal on-street parking reduces at least one lane to its road width.

Most of the recent shopping centers have also been developed with shortage of parking facilities with respect to demand.

g. Inadequate Pedestrian Facility

The existing footpaths of the Dhaka city are being improved physically in the recent years. New footpaths are also being constructed. But there are many kilometers of roads without walkway facility. Moreover, there are a lot of problems relating to use of footpaths by the pedestrians. The most serious problem is the retailer traders and hawker on the footpaths, who eventually reduce the effective width of footpath. Other problems are, piling of building materials on road and footpath, rickshaw stands, rent-a-car service, garages etc. There are a lot of big size dustbins on the streets close to the footpath causing inconvenience to the passersby. At many areas of the city, people use the footpaths for toilet purpose creating public nuisance for pedestrians. In the streets of the Dhaka city, another serious threat to the safety of the pedestrian is posed by the 'traps of death', that in the open manholes on the roadways as well as on the footways.

h. Flyover Integration Plan

During last few decade a number of flyovers (Mohakhali, Jatrabari, Kuril, Banani, Khilgaon) have been built in Dhaka city by different organizations (RHD, DCC, RAJUK, Cantonment Board and, LGED). Currently, Moghbazar-Mouchak flyover is under construction. But it has not been integrated with Hatirjheel project and the proposed Shantinagar- Jhilmil project at Keraniganj. Most of the flyovers have been built on ad hoc basis without any integrated corridor approach in mind. In future an integrated corridor approach should be followed for flyovers keeping in mind multimodal transport facilities (BRT line, MRT line, ring road and elevated expressways).

i. Road Accident & Safety Audit

Pedestrians in Dhaka deliberately cross the road at any point for their own convenience ignoring the consequence of possibility of fatal accidents. Over-bridges are occasionally used by the pedestrians and they simply cross the road walking through any available narrow space between two following vehicles. Road safety audit on major roads should be planned and implemented to increase safer roads along major DMDP corridors. Road safety culture is absent among the road users, who are usually the victim of road accident in Dhaka (about 70% of the road accident victims are pedestrians), and fatality is more pronounced in peri-urban area where the vehicle speed is higher.

5.5 Future Plan and Direction

5.5.1 Goal

SAFE, AFFORDABLE, SUSTAINABLE AND CONNECTED COMMUNITIES

Communities will find better places to live, work and raise a family, with easy and safe access to social and economic opportunities, whether in core part of Dhaka City or in regional and sub-centers of Dhaka Metropolitan area. An effective network of connectivity will foster the safe, efficient movement of people and goods and contributes to Dhaka's economy. Roads and highways and other mass transits directly connect to other transportation modes and are vital to moving of products to markets both within and outside the RAJUK area. To achieve the goal following issues will have to be addressed:

- Providing a greater choice of travel modes (BUS/BRT/MRT/RAIL/Taxi);
- distributing goods and services more efficiently;
- Improving road safety;
- Reducing the environmental impacts of the transport system;
- Fostering medium density development;
- Utilization of water way transport network;

To attain the above goal the following objectives policies have been recommended.

5.5.2 Objective and Policy

OBJECTIVE-TRANS 01: TO PREPARE LONG TERM TRANSPORT NETWORK PLAN

The main objective of the strategy is to establish a long term major (Mainly primary and secondary) road network for the Dhaka Metropolitan region which will effectively serve the needs of the growing urban concentrations, by providing improved access to the main urban itself and linkage to areas with potential for growth. Improved and connected road communication will be used as a positive instrument for the promoting urbanization in the urban center proposed in the revised Structure Plan.

Policy-Trans/1.1: Enhancing the Linkage between Land Use and Transport Network

Efficient land-use plans (e.g. compact, mixed and walkable) allow less reliance on expensive mobility systems in general. An integrated approach to land use and transport harmonizes planning of the bounded confines of specific ministry and departmental mandates, turning them into a coordinated and integrated exercise at policy and operational levels. Properly designed transport systems contribute to business expansion, increased economic output and employment generation. Mobility is indisputably a necessary precondition to economic growth and expansion.

Strategic Action:

- Coordinated approach to transport planning in collaboration between RAJUK and DTCA.
- Transport-oriented development and traffic-calming interventions involve systemic and managerial aspects ensuring convenience, efficiency, aesthetics and safety of mobility.

Implementation Tools

- Promote proposed urban center based development to reduce travel demand (Please see **Map-5.1**);
- TOD based development close to mass transit (MRT/BRT) stations can ensure effective and affordable mobility.
- All urban centers should be developed providing wide variety of residence with public facilities to reduce travel demand.
- Approval of major traffic generating developments should be permitted only if the adequate road capacity is in place.
- Proper integration of land use and transport system that is resilient to extreme weather events and emergencies;
- The impact of land use on the transportation system should always be evaluated when plans are adopted and policy decisions are being made.

Implementing Agency:

RAJUK, DTCA, City Corporations and Pourashavas

Policy-Trans/1.2: Construction of Ring Road

The main purpose of a ring road is to relieve the town centres from cross traffic. It is meant both to divert traffic that has no business in the core centres and to redistribute traffic bound in and out of core centers.

Box-5.1

Development of Ring Roads

The location of Dhaka is in the center of the country. The national and regional highways have been planned and constructed in such a way that the major highways pass through the heart of Dhaka city. In order to lessen the highway traffic from the travel delay due to passing through the city, several ring roads are necessary.

Ring Roads with grade-separated radial connectivity to outside (of Ring) highways and inside (of Ring) city primary roads will provide the uninterrupted movement for passenger and freight vehicles.

Ring roads are proposed at about 10 km, 15 km and 20 km radius from the center of Dhaka.

Likewise, heavy transport should be led away from the town centre, and the flow of car traffic should be distributed via different areas into the centre of town. The ring road should improve the vehicular access to a town centre; it should offer better traffic flow through the town as a whole.

RDP Consultants have proposed three Ring (**Inner, Middle and Outer**) roads to ease efficient movement of traffic and to increase the mobility of the RAJUK area (**Please see Map-5.2**).

- **Strategic Action:**

From the outset the ring road will need strict controls on adjoining land to ensure that high traffic quality is maintained. Such controls would include:

- No direct access from adjoining properties, to avoid on-carriageway parking and servicing;
- No direct connections from lower order roads,
- Creation of grade separation at major roadway intersections;
- Creation of high speed roads with green buffer zone
- Provide parallel service roads;
- Maintain adequate ROW for proposed ring roads.
- Costs of Ring roads are included in the Cost Table (**Annex-5.1**).
- If ring roads are implemented, the traveler/users will get variety of options to enter/exist in/from the Dhaka City area;

- **Implementation Tools:**

- Inner ring road to reduce traffic congestions by sharing existing traffic volume of the city. Some parts of inner ring road has already been implemented and operational, immediate construction of remaining parts from Demra to Abdullahpur is required to complete the proposed 1st Ring road around Dhaka City area;
- Both Middle and outer ring road have been proposed to divert from the Dhaka city core all local traffic and other traffic which have no business in the town centre;
- After construction of Padma Bridge, the pressure on transport system of Dhaka will be more, as there is no alternative route except Dhaka-Mawa via Kanchpur Bridge to go to Northern and South-Western part of Bangladesh from Khulna and Barisal Region. Middle Ring Road has been proposed to divert traffic from Dhaka City to both northern and north-eastern part of Khulna and Barisal region of Bangladesh;
- Construction of Ring road will reduce the demand of East-West continuous road connection;

- **Implementing Agency** : RAJUK, DTCA, LGED, RHD, City Corporations

Policy-Trans/1.3: Incremental Road Network Development

The transport networks have been planned in a manner to connect the regional and sub-regional centers with mass transit, ring roads and arterial roads (**Map-5.3**). It will utilize limited resources in the most cost-effective manner over a sustained period of time through phased out development.

- **Strategic Action:**

- Prioritize transport infrastructure and services to encourage mixed-use development in central and outer urban areas
- Road networks to relieve much of presently overloaded urban network of inter-district, movements that have to traverse the congested central area and to ease movement to center to center;

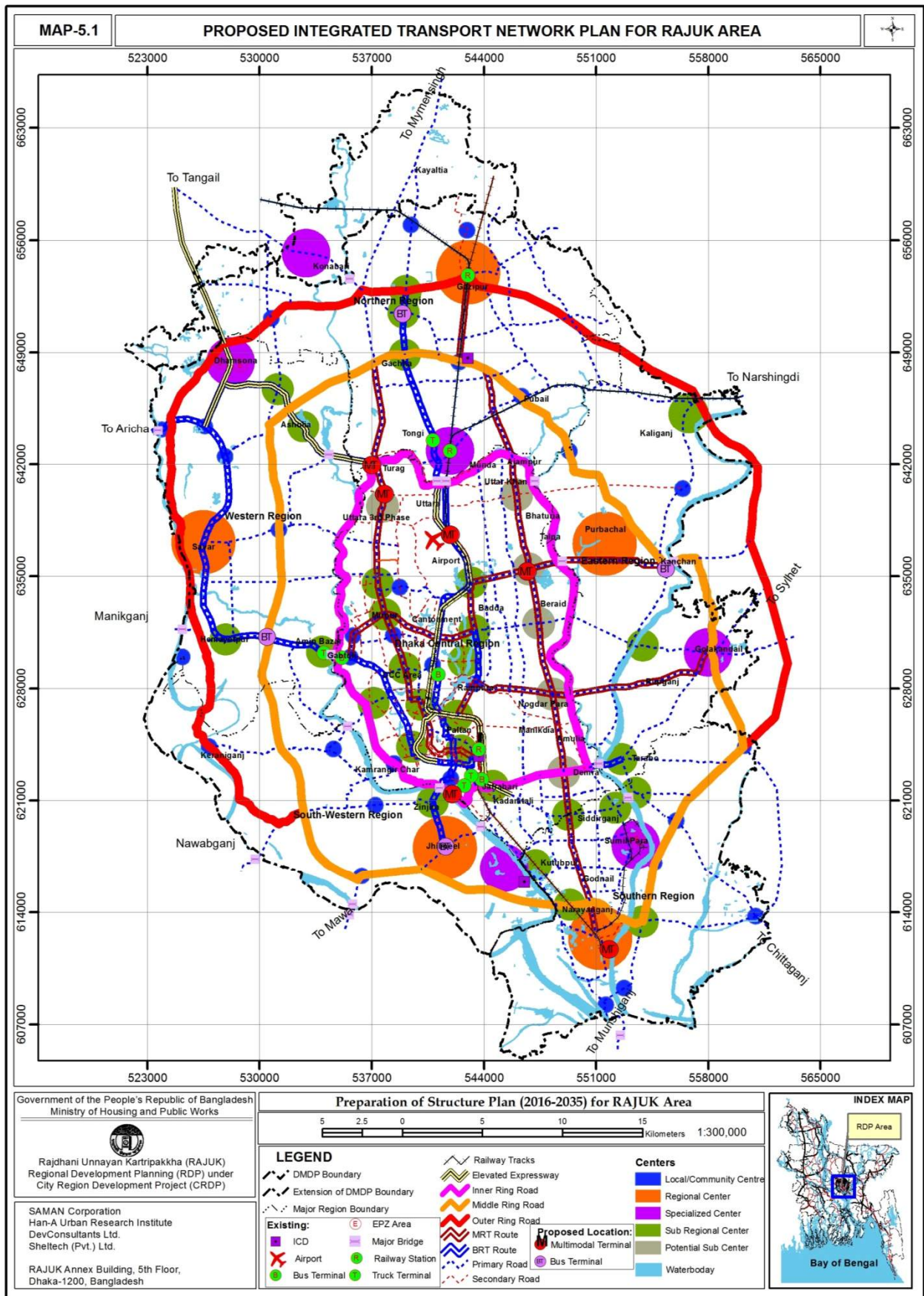
- **Implementing Tools:**

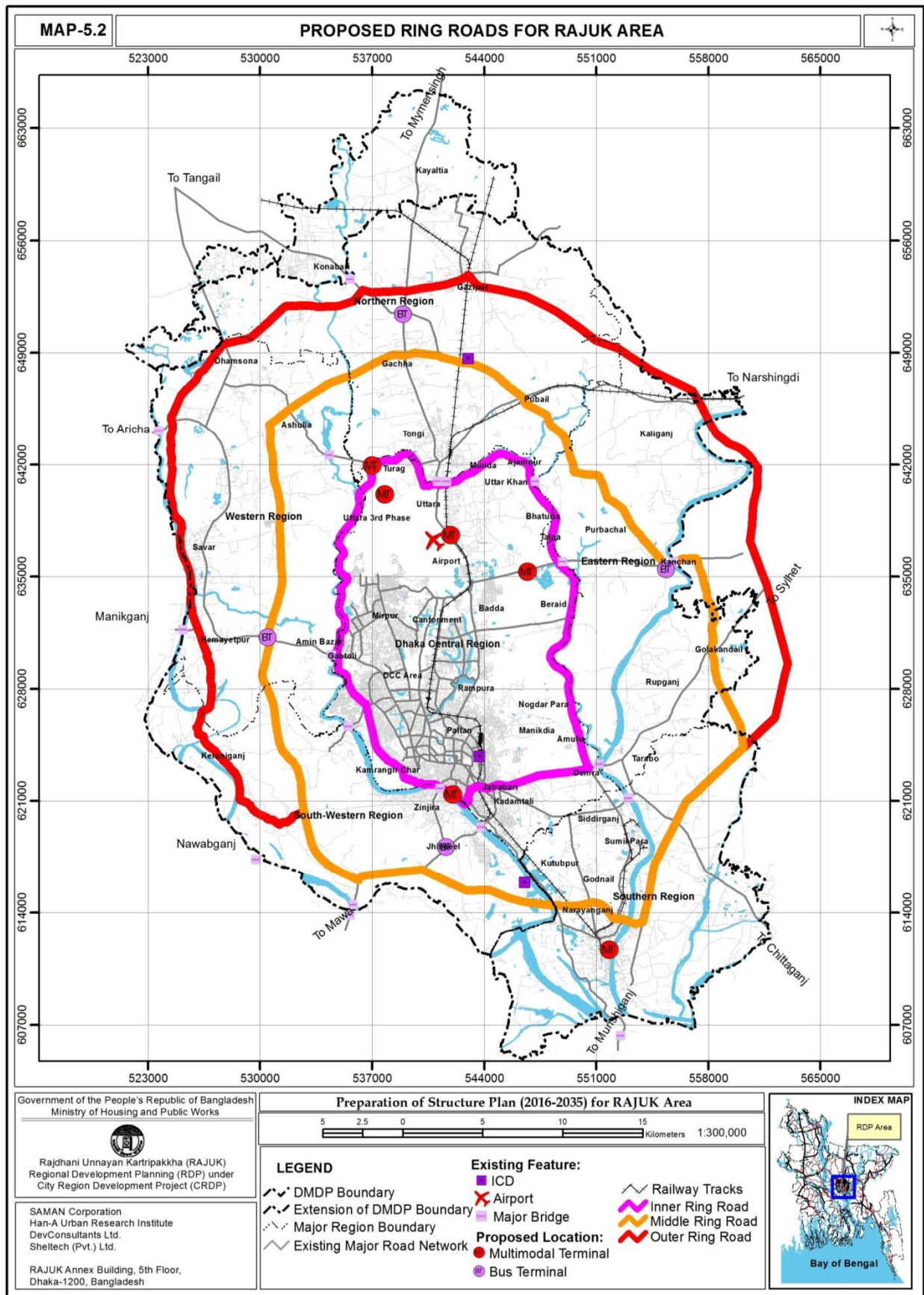
- ROW reserves are maintained free from development, even prior acquisition for initial road development; assist both property owners and control officers in knowing physically where a ROW exists, the reserves should be pegged out on the ground, once an alignment has been determined;

- In order to segregate local traffic and thorough traffic, all National highways and Bypass road should be made dual carriageway and NMT free for high speed vehicle with provisions of service road for slow speed vehicles.
- In order to fulfill huge future transport infrastructure need Government should encourage more PPP type project for major road construction;
- Development regulation measures could be taken for lands along National highways and Bypasses upto a depth of 100 meters on both sides, permitting only the uses which do not affect desired level of services of the route, are not detrimental to the visual quality of the highways and are conducive to the environment and serve as prelude to the development of Dhaka City Region.
- Maximum intersection spacing of major roadway may be three to five kilometer;
- Bicycle road networks and walkways will be formed and linked with green spaces, including government office buildings, bus stops and schools.
- Creation of high speed roads with green buffer zone.
- All the roads proposed by RAJUK's zonal plan will be included in DAP.

- **Implementing Agency:** RAJUK, LGED, RHD, City Corporations

Some of the network segments proposed for developments in the first phase are already programmed or in the process of development. The incremental network development in different phases is included in **Annex-5.2**.





Policy-TRANS/1.4: Establishment of Hierarchy of Roads

Most of the Dhaka city transport developments have been driven by ad hoc considerations. They lack specific focus on analysis of present travel demand or future requirements. Hence, city road network is not organized or integrated considering connectivity or mobility. Lack of proper institutional/regulatory framework and low enforcement tendency, everything is lagging behind the current needs. The road hierarchy is poorly established and most new development is taking place without any coherent road system. As population grows and as traffic density increase, accessibility will deteriorate, if there is no established hierarchy of road.

- **Strategic Action:**

- Collaboration among agencies to establish road hierarchy. In order to be able to better optimize the use of existing road systems, a review of the actual status of all existing roads should be carried out, and a hierarchy system established which would give priority to public transport system for the primary road, and limit the use of rickshaw to local roads only.

- **Implementing Tools:**

- DTCA in collaboration with RAJUK, City Corporation and Pourashavas may shoulder this task.

- **Implementing Agency:** DTCA, Local Government Agencies, Metropolitan Police (Traffic), RAJUK, BRTA

Policy-Trans/1.5: Encourage Development of Sidewalk and Bicycle Route for Both Mobility and Recreation Purposes.

There is great dearth of well planned and connected pedestrian facilities with the RAJUK area. Under the World Bank funded CASE project, DCC has constructed sidewalks and several foot overbridges at important locations which are still insufficient for the city.

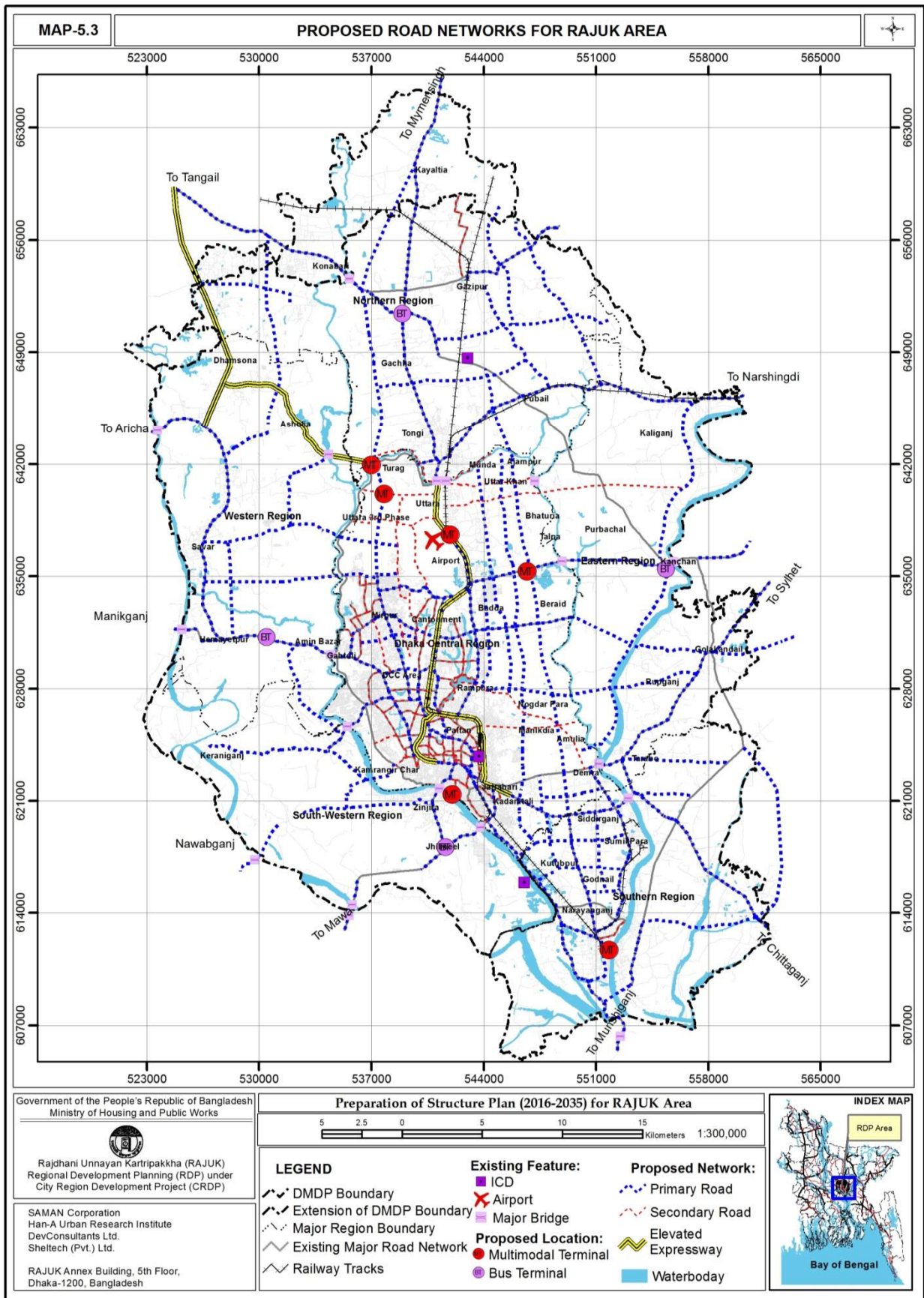
- **Strategic Action:**

- Develop a policy for sidewalk construction with an eye toward more and better mobility and recreation.
- DCC should prepare a comprehensive plan for the development of side walk at high volume pedestrian locations including road crossing facilities.

- **Implementation Tools:**

- Pedestrian ways should be constructed in a manner that feels safe for the user, particularly on busy streets.
- Pedestrian ways should be separated from the traffic lanes, either by fencing or a planting strip;
- Transit stations and stops (Bus/Rail) will be reachable from sidewalks, greenways, or bikeways.
- Develop a safe circulation system for bicycles by designating routes over lightly busy/traveled streets and ensuring continuity along those roads, and encouraging new commercial developments to provide safe storage areas for bicycles.
- Implement a program of pedestrian facility provision to serve pedestrian better and encourage people to walk from choice than necessity;
- Provide pedestrian/cycle accessibility to neighboring facilities including, schools, shops, parks and recreation facilities, community facilities, bus stops, train stations etc

- **Implementing Agency:** DTCA, Local Government Agencies, Metropolitan Police (Traffic), RAJUK, BRTA



OBJECTIVE-TRANS 02: TO MAKE PUBLIC TRANSPORT EFFICIENT AND SUSTAINABLE

Public transportation is the means of reducing traffic congestion, providing an economic boost to the areas of job relocation, and most importantly, contributing to a green environment by reducing carbon dioxide (CO₂) emissions. Using Public transportation can result in a reduction of an individual's carbon footprint. Using public transportation saves CO₂ emissions in more ways than simply travel as public transportation can help to alleviate traffic congestion as well as promote more efficient land use. Social balance is also maintained by providing efficient and effective public transport because low income cannot afford to own and operate private car.

Policy-TRANS/2.1: Introduction of Urban Rapid Transit (BRT and MRT)

Mass Transit systems are designed to carry large number of passengers in an efficient manner and this is particularly important during rush hours. Introduction of mass transit system based on hierarchy of public transport system presently, the public transport systems in Dhaka are operating only road-based low capacity transit system. Therefore, it is necessary to introduce the Mass Rapid Transit (MRT) and Bus Rapid Transit (BRT) Systems to meet future transport demand. High capacity public transport should be given more priority. Ongoing BRT and MRT projects should be accelerated, and the necessary institutions should be set up with trained staff to implement and monitor the operation of the system. It would add effective scale and critical mass to the urban area, bringing a transition to more sustainable methods of transport and ease congestion. In this regard, RDP consultants have proposed 5 MRT and 3 BRT Routes within the RAJUK area. Please see **Map-5.4**.

- **Strategic Action:**

- Mobilize multiple partners and look for funding sources in collaboration with stakeholders, and creative marketing to successfully implementing the project providing multimodal transit system.

- **Implementation Tools:**

- DTCA should conduct conceptual design of major infrastructure projects (BRT, MRT, ring road) in a integrated manner to avoid future complication and provide guidance for future detail design of interchanges;
- DTCA should promote and attract the Government/Developing partners to take up projects in this regard.
- For convenient uses, transit stops, transit parking places, complex transit centers will be installed.
- Promote Transit-Oriented Development (TOD) along BRT/MRT Stations in close cooperation with transport corridor and urban development (**Map-5.6**);
- Depot and station areas along the proposed mass transit corridors should be earmarked during Detail Area planning (DAP) of 2016 - 2035;

Box-5.2

Mass Transit System Development

Mass transit system has been recommended, focusing on trip characteristics taking account of urban socio-economic indicators of the target year rather than current income level and economic activities of Dhaka City. Route shall be developed in the aspect of balanced development of the entire city rather than the traffic control of the existing urban area. The future traffic volume will be about 60 million passenger trips per year. Considering the limited road space and high traffic flow on the road, mass transit system is essential and the government must establish MRT and BRT system to tackle high traffic volume in the future.

Share of the opening of the MRT as the means to transport can carry about 10% of the traffic and by **5 MRT lines in 2035 (Table-5.5)**. 800 meter (or 0.8km walking distance) wide belt on both sides of centre line of the Mass Transit route covers about 41.36% of total urban promotion area, while the coverage will be about 66.31% when it is 2000 meter belt (2.0km walking distance), please see **Map-5.5**. In this context the Metro corridors upto a certain depth would require selective redevelopment and re-densification/intensification of existing land uses based on site conditions. It is proposed that comprehensive redevelopment schemes of the influence area of Mass Transit corridors are to be prepared.

- DTCA should apply the integration of transport ticketing system among different modes of transport (i.e. Railway, Bus, BRT, MRT, and Waterbus).
- Vertical clearance for crossing road should be 6 to 7 meters and where elevated road is anticipated clearance should be at least 13 meters.

- **Implementing Agency:** DTCA, Local Government Agencies, Metropolitan Police (Traffic), RAJUK

Table-5.5: Modal share with consideration to MRT (in thousands)

Item		Car	Bus	Rickshaw	Others	Rail & water	Walk	MRT	Total
No MRT	2013	2,016	10,708	12,724	38	66	5,803		31,355
	2015	2,518	12,894	13,145	49	87	6,184		34,877
	2025	5,520	20,739	15,338	94	164	7,784		49,639
	2035	9,737	24,782	16,360	120	203	8,572		59,774
5 MRT	2013	2,016	10,708	12,724	38	66	5,803		31,355
	2015	2,518	12,894	13,145	49	87	6,184		34,877
	2025	5,054	19,387	14,549	90	159	7,665	2,735	49,639
	2035	8,772	21,745	14,698	113	195	8,356	5,895	59,774

Source: Compiled by Consultants, RDP, RAJUK, 2014

Policy-TRANS/2.2: Promote Improved Bus Transport System, Network Restructuring and Route Franchising

The provision of safe, convenient, reasonable and reliable public transport services is a challenge to improve the exhausted urban transport in RAJUK area. As the share of railway services in the transport system is only of a small portion due to the inter-city specific operation, public transport in the region relies mainly on buses. Unfortunately, the present bus service is quite far below a level of satisfaction.

The bus network study has recommended restructuring of bus routes (reducing overlap), scrapping of old vehicles, gradual replacement of existing vehicle fleet (over next ten years) modernization of bus operation management, improving infrastructure (dedicated bus lane, increasing bus stops and bus stops.

- **Strategic Action:**
 - Introduction of “**Bus Route Franchising System.**”
 - To increase the efficiency and reliability of the existing public transport network (rail and bus) mobilize more investment;
 - The quality and design of buses would have to be significantly upgraded with a view to providing comfort to the riders and thereby make bus travel a part of an efficient mass public transport system which could also help to reduce individualized/ private vehicle usage.
- **Implementation Tools:**
 - **Ministry of Road Transport and Bridge (MORTB)** should urgently approve the recommendation of the Dhaka Bus Network and Regulatory Reform Implementation Study.

Box-5.3

Bus Route Franchising

Current bus operations are characterized by poor quality of services, including lack of scheduled operations, poor condition of buses, degrading safety and comfort levels, violation of traffic rules and so forth.

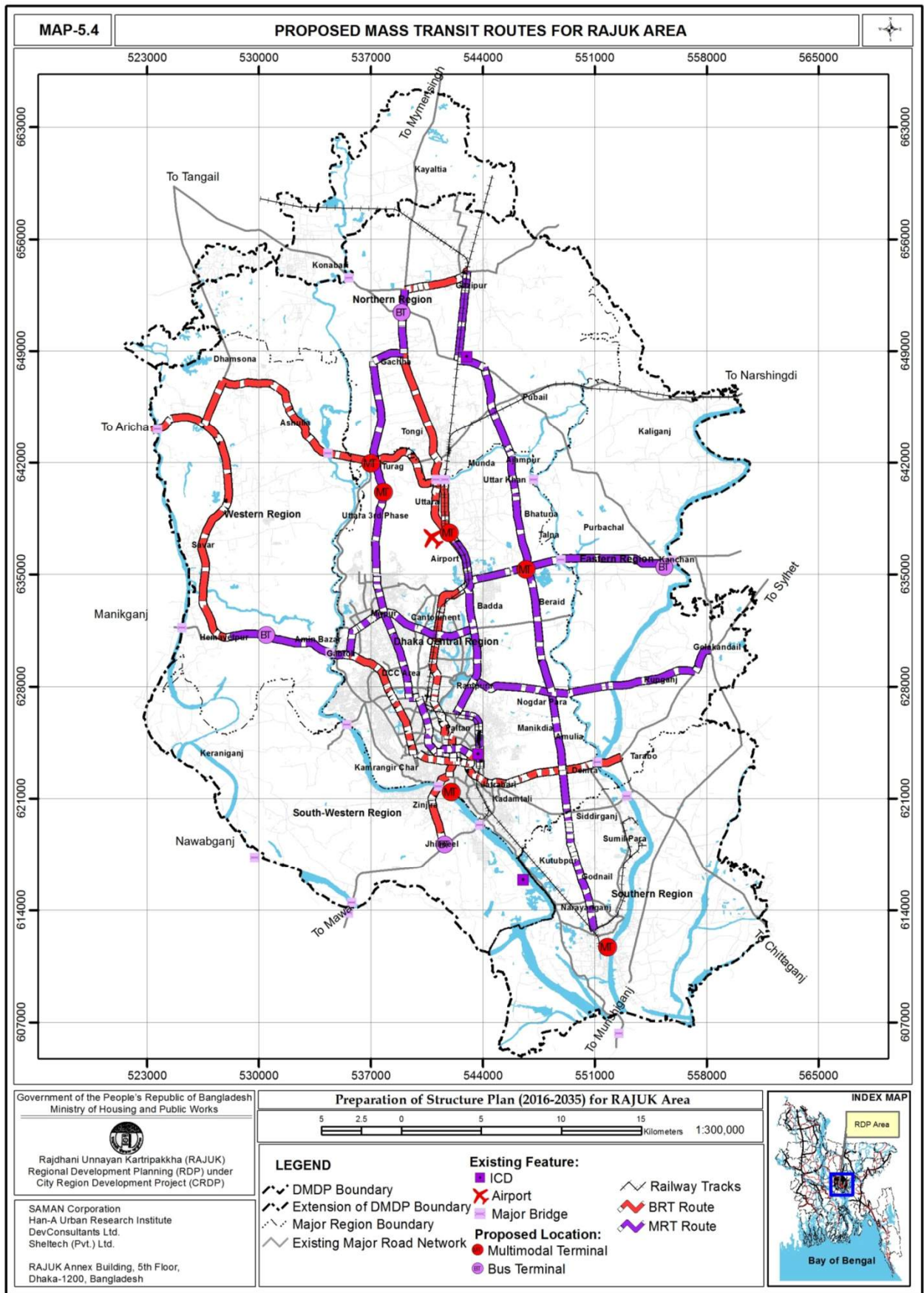
The Government should review the World Bank "Bus Network Study" and execute bus route franchising system which will reduce number of informal bus operators and encourage formation of small group of operators with larger bus fleet.

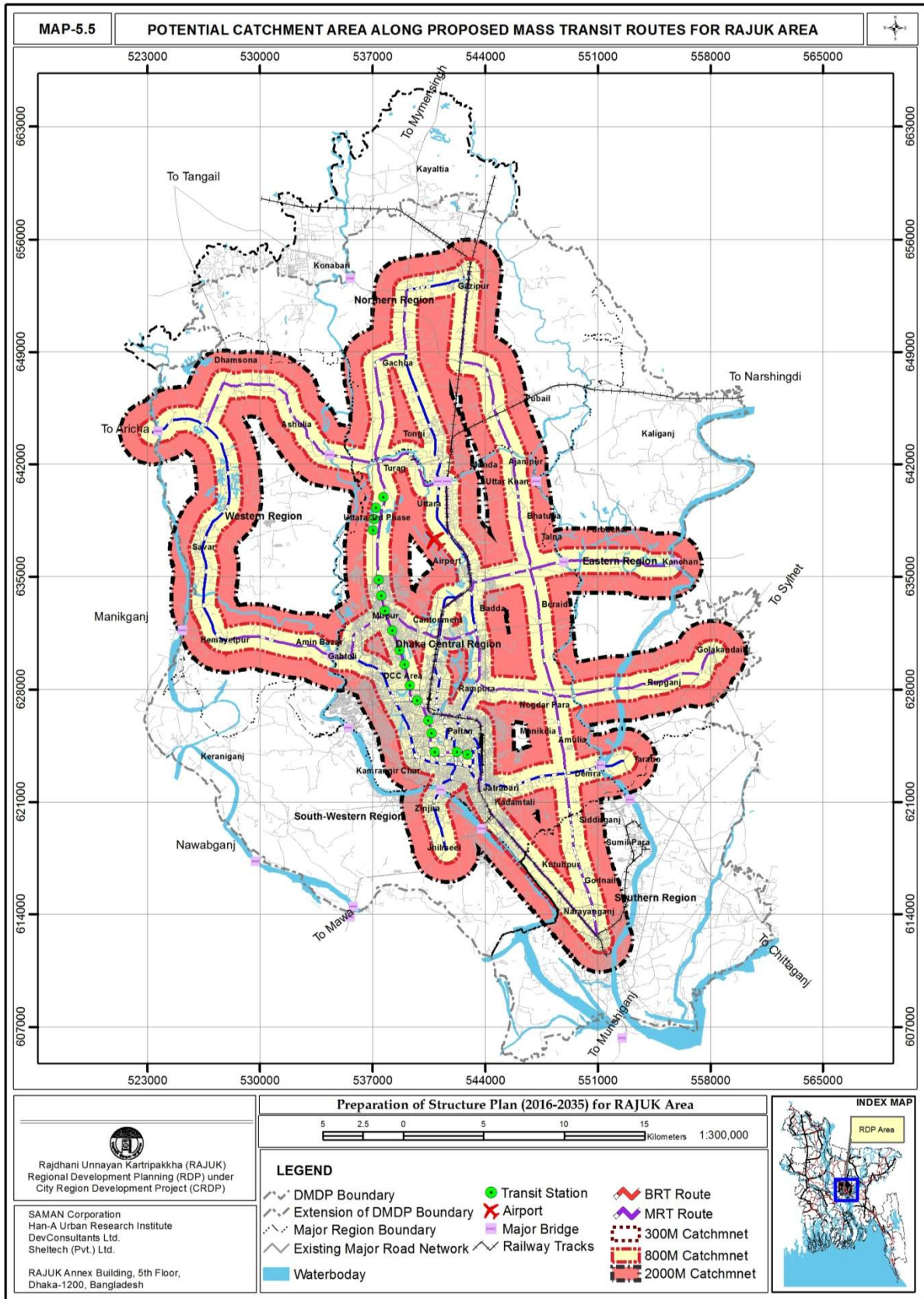
- **MORTB** should take reasonable actions to improve bus network by introducing the outcome of the Bus network study.
- Promote **Transit-Oriented Development (TOD)** in the major transport corridors in close cooperation with transport corridor and urban development;
- Develop the comprehensive bus route map;
- The increasing number of Minsibuses would be reduced;
- Campaigning for promoting urban public transportation use;
- Establishing the common ticketing system, bus fare system etc;
- Introduction of electronic technology such as automatic fare collection machines;
- Establish a subsidy system for the poor/vulnerable transport users;
- Establish a training centre for public transport drivers;
- Develop new bus, truck terminals, freight terminals and public bus garage etc;
- **Implementing Agency:** Ministry of Road Transport and Bridges, BRTA, City Corporation.

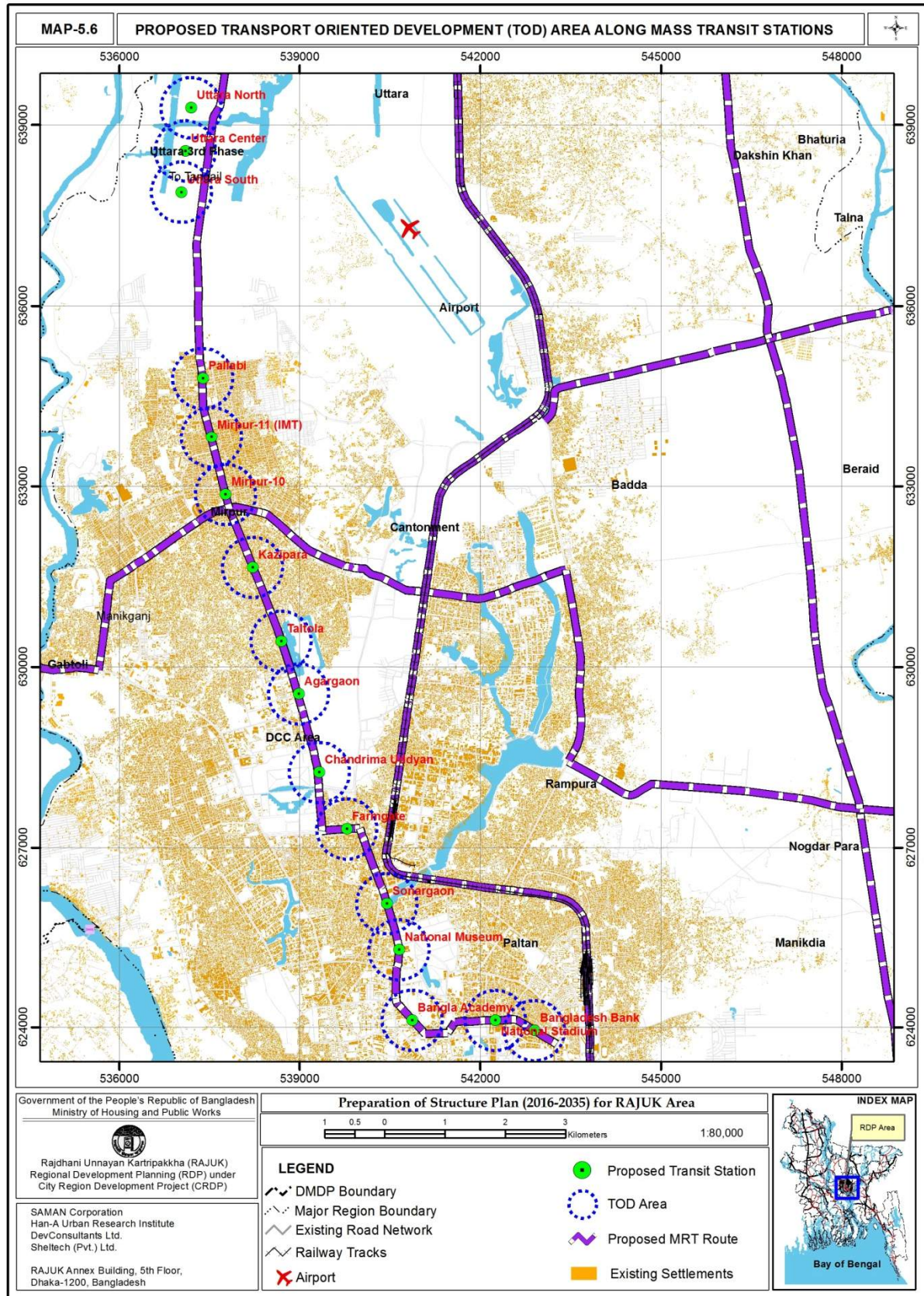
Policy-TRANS/2.3: Integration of Waterway Transport with Bus Network.

Dhaka City is surrounded by rivers and khals, which is mostly unutilized. Circular water way transport was proposed by DMDP Structure Plan (1995-2015) to efficiently utilize these natural opportunities. Revised Structure Plan is also continuing the same proposal again, as it was not implemented properly. Navigability of the encircling water ways will enlighten the old heritage of Dhaka and enhance the riverine recreational facilities in a great way. Besides, bulk goods can be transported to different consuming areas by passing. Transportation cost of different consuming goods will thus be reduced and people will get the benefit.

- **Strategic Action:**
 - Develop navigability of the encircling water way;
 - Disperse traffic loads of water transport;
- **Implementation Tools:**
 - BIWTA in consultation with BRTA should properly locate waterway stations to improve connectivity with city bus network;
 - regular dredging of rivers and channel to make the route effective;
 - In order to achieve success with circular waterway transport, integration with bus network is necessary. in this regard construction of missing part of proposed inner ring road of RDP project is mandatory;
 - Introduction of eco-transport measures, such as Water-Taxi to make an eco-friendly city;
 - Develop multi-modal transport terminals at different locations to ease traffic flow at water terminals;
 - Provision of multimodal transfer facility between river port and railway station with bus facility can reduce travel time for the passengers.
- **Implementing Agency:** DTCA, BIWTA, MORTB, BRTA, City Corporations.







Policy-TRANS/2.4: Introduction of Commuter Trains.

This policy will supplement the policy for Railways (**Section 9.6**) of National Land Transport Policy (2004). Commuter railway system should not be operated in a scattered manner; it should be operated on selected priority routes with adequate capacity, usable platforms, regularity, and efficient customer service.

- **Strategic Action:**
 - Introduction of efficient and faster commuter train service using available tracks and railway infrastructure.
- **Implementation Tools:**
 - New railway network may be developed to connect Rajbari via Manikganj, Sayedabad to Padma Bridge along Dhaka-Mawa Road, and Narayanganj to Munshiganj etc from Dhaka city by introducing faster commuter trains.
 - Eastern Railway should study introducing faster commuter trains between Narayanganj-Dhaka route, Joydevpur-Dhaka route, Dhaka-Tangail route, Dhaka-Brahmanbaria route.
 - Necessary rolling stock may be procured in this regard.
 - Underground new railway tract may be introduced along proposed eastern bypass;
 - Develop Station area of Naryanganj as Major Transportation hub. This area can be developed as per the **Vision Master Plan** of Narayanganj City Corporation;
 - Private sector may be engaged in operation of trains;
 - All major grade-crossing should be addressed to provide safe and efficient movement of rail and road traffic.
 - Feasibility study for developing new railway link may be taken by BR;
 - Mono rail system around Hatirjheel Lake Project may be introduced to facilitate public transport as presently only rich communities are being benefited by this project.
- **Implementing Agency:** DTCA, Bangladesh Railway (East), Local Government Agencies, and Metropolitan Police (Traffic).

Policy-trans/2.5: Introduction of Efficient and Affordable Taxi Cab Service

Dhaka city is the only megacity without sufficient and organized taxi cab system. Efficient and affordable taxi service can greatly reduce the use of private cars. Kualalumpur with a population of 2 million have 25000 taxis, It is strongly recommended that by 2015 the number of taxis should be increased to at least 5000, and in 2020 at least 20000, and in 2030 at least 50000, in addition to increasing the number of taxis, dedicated taxi stand should be provided at markets and commercial places.

- **Strategic Action:**
 - BRTA should take pragmatic measures to introduce taxi cab affordable by majority of the city dwellers.
- **Implementation Tools:**
 - GOB should provide incentive including provision of taxi stands to increase number of taxi.
 - Sufficient taxi stands should be provided at commercial places, Bus Station, Railway Station, Airport and Heritage sites to attract tourists etc.
- **Implementing Agency:** Ministry of Transport and Communication, BRTA, and City Corporations.

OBJECTIVE-TRANS 03: TO ENSURE EFFECTIVE TRAFFIC MANAGEMENT

Traffic management measures are necessary to optimize the existing infrastructure to improve flow capacities and to be more responsive to traffic demand at different times of the day. The measures to road safety include signalized junctions, one-way street system, and reversible lanes to increase lane capacity during peak hours, dedicated bus lane, penalties for on-street parking, and controlling heavy vehicle entry into the city during peak hour. Out of the above mentioned measures, only traffic signal (mostly managed manually by traffic police causing severe traffic congestion), and restriction of heavy vehicle entry is currently practiced in Dhaka.

Due to lack of training performance of traffic police is not up to standard. Moreover, the mix of NMT and motorized vehicle at signalized junctions complicates traffic control. Use of traffic sign, barriers, lane marking, and pedestrian bridges should be more pronounced. The gap between increasing transport demands and the capacity to accommodate the demands is hardly fulfilled only with physical development of infrastructures, because of serious constraints against funds, land space, time and technologies.

Policy-TRANS/3.1: Integration of Travel Demand Management (TDM) in Planning Process

TDM is the application of strategies and policies to reduce the number of single occupancy vehicles coming to and parking on area by means of promoting alternative methods of travel, thereby reducing traffic congestion and improve air quality by maximizing the use of existing infrastructure. Transportation-efficient development is characterized by higher density and mixed land uses, access to frequent transit service, and opportunities for short pedestrian and bicycle trips to a rich mix of desired destinations. It is expected that the number of trips in RAJUK area will to be tripled in 2035, if current trend continues. It would be difficult to build new roads or widen the existing road in the city. Therefore, Travel Demand Strategy should be followed which will aim to redirect movement patterns from private to public transport by integrating different transport modes, extending and promoting public transport and discouraging the use of private transport. Travel Demand Management can be achieved by adopting the following tools.

- **Strategic Action:**

- Reducing travel demand, particularly at peak commute hours, instead of increasing roadway supply actions and make more efficient use of the current roadway system using TDM.

- **Implementation Tools:**

Travel Demand Management can be achieved by adopting the following tools.

- Make more efficient use of available road capacity through traffic demand management measures and road space reallocation to more sustainable modes.
- Provision of incentives to use alternative modes and reduce driving like road and parking pricing, road space allocation (dedicated bus lanes, bike lanes and transit-only lanes)
- Introduction of Parking Management, like Parking cash-out programs, landuse management, priority parking for carpools, vanpools, and short-term parkers, provision of more mixed use development, and increased densities in transit corridors;
- Provision of high capacity transit service in reducing travel demand and shifting travel away from **single-occupant vehicles (SOV)** to more efficient modes.
- Alternative work arrangements (such as compressed work weeks and telecommuting) to eliminate commute trips one or more days per week.
- Working with major traffic generators (employers, schools, business parks, and event venues, airports) to induce mode shift to cleaner modes.
- Build compact communities with sufficient density to support high-frequency transit service.
- Discouraging private transport imposing higher tax. Congestion charge and higher parking fee at CBD area during week days can discourage use of private cars during week days.
- Sharing of time and space by staggering office hour (different timing for private and public office) and school and university time can greatly reduce the peak hour traffic volume.

- Using information technology-like, video conferencing between corporate head office and branch office of commercial establishment for important meetings- would minimize the need of travel.
- **Implementing Agency:** RAJUK, MORTB, DTCA, Local Government Agencies, Metropolitan Police (Traffic)

Policy-TRANS/3.2: Management of Rickshaw-based Transport (Rickshaw, Rickshaw-van, Carts etc.)

This policy will support the policy for Non-motorized transport (**Section 9.2**) of National Land Transport Policy (2004). More corridors (especially bus corridors) should be made Rickshaw free, and Rickshaw should be restricted to residential areas only, in this regard a phase wise program need to be developed.

- **Strategic Action:**
 - Encouragement to rickshaw within the neighborhood level and progressive ban on use in major roads, make available alternate transport and provide feeder service to public transport.
 - Rickshaws will be encouraged and assisted to ply on the lanes and narrow roads to serve local neighborhood demands and to provide feeder services from the neighborhoods to the main line rapid transit stops.
- **Implementation Tools:**
 - City Corporations, Pourashava, DTCA and Metropolitan Police should explore measures to control NMT through progressive ban on the use of slow moving vehicles (Rickshaw-based viz rickshaw, van, cart etc) on the city's main road to eliminate unequal competition between slow and fast moving vehicle to have the same small space. These slow vehicles may be allowed to move only in the locality and their vicinity.
 - The possible measure can be, expedite mass transit development, introduce affordable taxi cab, and limit movement of NMT within neighbourhoods and on major roads. But all the measures should be taken up simultaneously so that NMT users do not suffer for want of alternative mode of transport.
 - The respective authority will launch a stringent program of investigation into the present system of licensing of Rickshaw pullers in order to prevent non-approved pullers from operating vehicles;
 - The respective authority will design and encourage a program of training and an awareness campaign for the rickshaw pullers in order to improve their knowledge of traffic rules and road behaviour;
- **Implementing Agency:** DTCA, Local Government Agencies, Metropolitan Police (Traffic).

Policy-TRANS/3.3: Ensure Parking and Management for RAJUK Area

Parking is one of the most crucial needs for Dhaka city region. Lack of parking facility in any premises creates severe problem both for car users and non users. Nevertheless, this reality is often neglected in the transport policy making process. Ownership of private vehicle is increasing day by day which in turn increases the parking demand. On the other hand, an excessive supply of cheap parking induces people to use personal motor vehicles—even when good public transport is provided. Parking should be considered as a basic facility in transport planning. An integrated and balanced transportation system is the prerequisite of an urban area for its smooth functioning.

- **Strategic Action:**
 - Preparation of policies and guidelines of parking management of Dhaka through collective effort of DTCA and RAJUK.

- **Implementation Tools:**
 - Both RAJUK and DTCA should take feasibility study for development of underground Parking area at Osmani Uddayan Carryout parking demand survey and prepare zone-wise parking plan during DAP preparation and may take up more parking projects;
 - Extensive parking provisions with strong management would be considered as the foundation for a sustainable parking system;
 - DTCA in collaboration with City Corporations should impose on-street parking fee to control road side disturbances.
 - Every parker should be charged according to the time spent for car parking. Free parking encourages using private vehicle rather than public transport. Most of the cases, parking charge is collected at flat rate (charging a fixed amount with no time limit) or free. This rather encourages parkers to park their vehicle for a long time. So a uniform parking charge should be imposed to ensure an efficient parking facility.
 - Strictly ban on-street parking by zonal parking control in order to make more effective use of road capacity;
 - Parking fees are imposed to parking demand. When demand increases, the fee also increases. Parking revenue will be used to build better road infrastructure and to expand public transport;
 - Charges on the designated parking spaces should be lower than that of undesignated areas. This will enforce parkers to park their vehicles in the designated locations.
 - Parking demand can be reduced by lessening dependency on private car. This could be achieved by improving the provision of public transit facilities;
 - Establishment of parking improvement areas, like CBD areas;
 - Underside of Flyover should be properly landscaped to avoid illegal encroachment and made useful for parking.
- **Implementing Agency:** DTCA, City Corporations, Metropolitan Police (Traffic), RAJUK

Policy-TRANS/3.4: Ensure Traffic Impact Assessment (TIA) for Large Scale Physical Development Projects

This policy will support adoption of TIA (**Section 9.7.5**) of National Land Transport Policy (2004) for new large real estate, institutions, shopping complex and places of public gathering. TIA should be carried out at planning stage to identify road capacity and parking requirement. They should also monitor traffic impact regularly through carrying out traffic survey and suggest remedial measures. Multistoried apartments and big shopping malls are big traffic generators of Dhaka City area. Bashundhara Shopping Mall and Jamuna Future Park have been developed without the making any TIA. TIA would be mandatory for each and every large scale development.

- **Strategic Action:**
 - Make TIA a prerequisite for all new proposed development projects in designated urban areas in Strategic Plan and Detailed Area Plan where public gathering will be high enough to impact traffic movement.
- **Implementation Tools:**
 - DTCA and RAJUK should undertake impact study of proposed large scale development projects on their roads and provide mitigation measures for the development.
 - RAJUK will ensure that developers after getting project approval, will implement the recommendations of TIA;
- **Implementing Agency:** DTCA, City Corporations, Metropolitan Police (Traffic), RAJUK

Policy-Trans/3.5: Ensure the Road Assets Fit for the Future

To ensure the road assets are fit and suitable for the future, sufficient budget will have to be allocated for proper maintenance of roads.

- **Strategic Action:**
 - Identify and list out most dilapidated roads for continuing asset renewals within the RAJUK area.
- **Implementation Tools**
 - Resurfacing of carriageway whenever necessary or at least in every year.
 - Replacing street light using energy efficient LEDs.
 - Modernizing and effective use traffic signals.
 - Renewing road marking white lines and studs.
 - Regular clearing, repairing and upgrading surface drainage.
 - Renewing and repairing deteriorated bridge, overpass, and underpass elements.
- **Implementing Agency:** RAJUK, RHD, LGED, City Corporation and Pourashava etc.

Policy-Trans/3.6: Bringing Reduction in Fatalities and Serious Injuries on Roads

There has been an alarming rise in road accidents, significantly highway accidents over the past few years. According to a study conducted by the Accident Research Centre (ARC) of BUET, road accidents claim on average 12,000 lives annually and lead to about 35,000 injuries. According to World Bank statistics, annual fatality rate from road accidents is found to be 85.6 fatalities per 10,000 vehicles. Recently, road accidents in Dhaka City have been increased greatly.

- **Strategic Action:**
 - To make the roads safer and reduce deaths and serious injuries number of improvements activities will have to be taken with adequate fund.
 - Achieve a smooth and safe traffic flow at vehicles and pedestrian traffic intermingling points.
- **Implementation Tools**
 - Install and upgrade the network of safety cameras;
 - Improving the safety of road infrastructure, in particular the design of junctions, roundabouts, signals, and pedestrian crossings;
 - Working with the police to tackle unsafe behaviors of road users, including speeding, jumping red lights, drunk driving, mobile phone use, overloaded vehicles, uninsured and unlicensed drivers;
 - Improving crossings with pedestrian countdown systems and facilities to make them more accessible;
 - Median would be provided with high obstacles to control the indiscriminate crossing of pedestrian in roads;
 - Disseminating information on driving and road safety to masses through media and exemplary punishment for violating traffic laws will be rigorously ensured by the government;
 - Road safety education to pedestrians, especially children, within the communities by community leaders is also a good way to promote road safety.
- **Implementing Agency:** RAJUK, LGED, BRTA, Bangladesh Police, City Corporation and Pourashava etc.

Policy-Trans/3.7: Keep Dhaka Moving and Tackle Congestion

Planned enhancements to traffic light technology and developments to systems that support us will be vital in helping us manage traffic in real time.

- **Strategic Action:**
 - Ensure safer movement in critical and busiest junctions (**Map-5.7**).
 - Introduction of updated technology;
- **Implementation Tools**
 - Adequate manpower with technical knowledge and skill in transportation shall be recruited in Traffic Unit of Bangladesh Police to manage the traffic system properly;
 - Installing cutting-edge traffic light technology at different sites across the Dhaka City Region, **Split Cycle Offset Optimization Technique (SCOOT)** technology that automatically detects real-time traffic conditions and optimizes traffic light timings to reduce delays;
 - Enhancing sophisticated traffic models, which will support successful scheme design and help plan improvements to relieve congestion hotspots;
 - Introduction of **Intelligent Transport Systems (ITS)** programme to access to real-time data, giving the Streets Traffic Control Centre cutting-edge technology, (**See Box-5.3**);
 - Revitalize Traffic Control Centre for actively managing congestion in Dhaka city in real-time, by identifying traffic hotspots and changing traffic light phasing to improve traffic flow on the roads;
 - Creation of grade separation (Elevated/vehicular underpass) at major roadway intersections for efficient movement of traffic;
 - **Peak hour Congestion Pricing/Electronic Road Pricing (ERP)** technology can be introduced which is proved to be successful to reduce traffic congestion in cities like London, Singapore, Stockholm and Oslo.
 - Provide overpass/underpass at major roadway intersections for efficient movement of pedestrians;
 - Limiting hawkers to specific locations, rehabilitation and free the footpaths as much as possible.
 - No bus stoppage and rickshaw parking will be allowed within the 50m of roadway intersection;
 - No hat or bazar will be allowed on major roads;
- **Implementing Agency:** DTCA, Local Government Agencies, Metropolitan Police (Traffic), RAJUK

Box-5.4

Treatment on Interchange Point

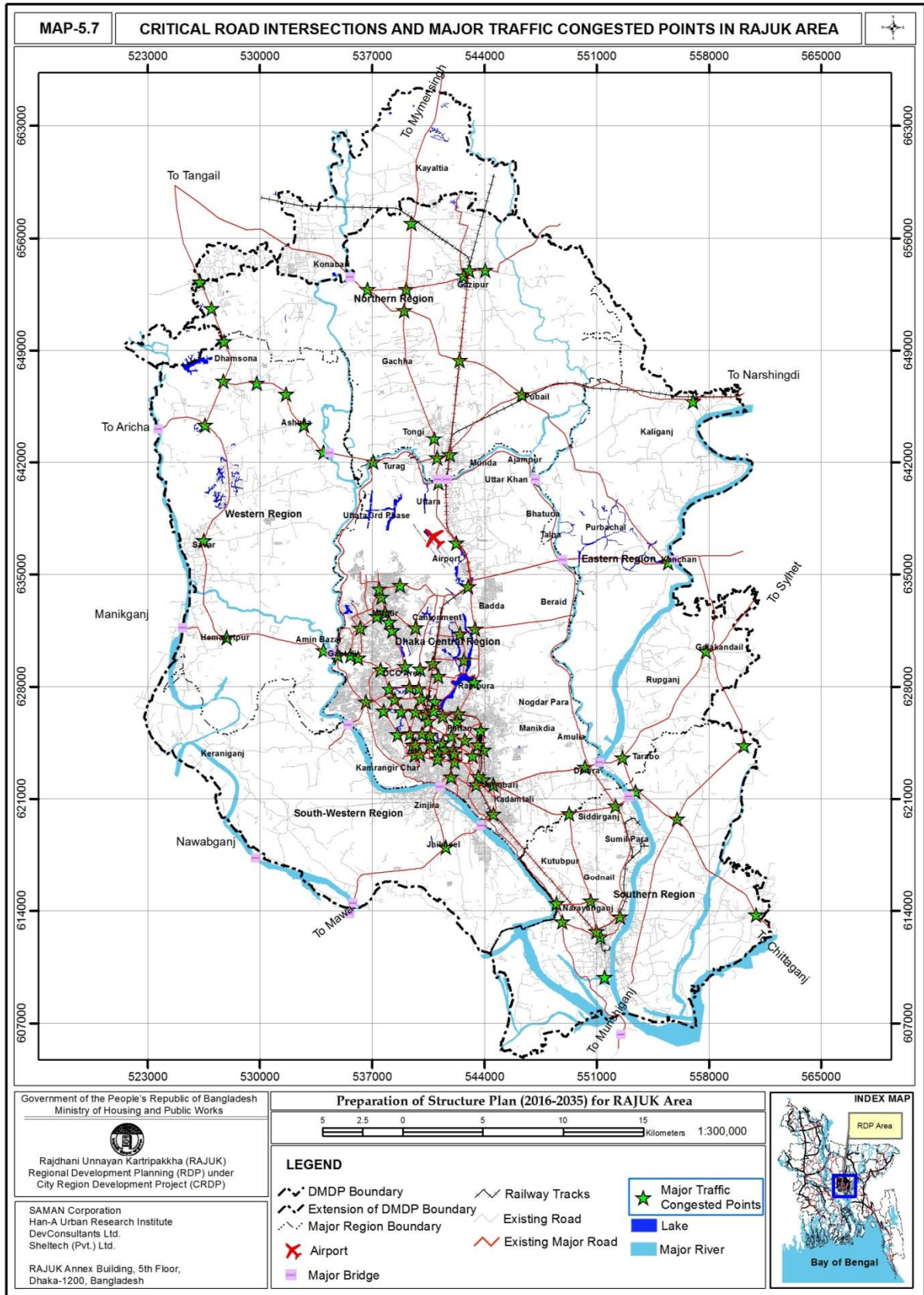
The interchange points of Primary Road, Mass Transit Routes, Ring Road, Rail and any other future rail network should be developed as interchange stations/convergence zone. The change over facilities should include approach roads, pedestrian walkways, shuttle services, wherever feasible parking, areas for various modes including feeder buses, and adequate public conveniences, etc.

Box-5.3**Introduction of Intelligent Transportation System (ITS) in Dhaka Region**

Intelligent Transportation Systems (ITS) technology is established worldwide which the general term is used for new road transport systems driven by advanced information and communications technology. Congested roadways and general concern for the environment are the principle reasons why these technologies are promoted. ITS, is expected to help resolve these problems by eliminating the amount of time people are wasting in traffic jams and producing exhaust gases.

Japan already has developed ITS, which has following benefits:

- Advances in Navigation Systems
- Electronic Toll Collection
- Assistance for Safe Driving
- Optimization of Traffic Management
- Increasing Efficiency in Road Management
- Support for Public Transport
- Increasing Efficiency in Commercial
- Support for Pedestrians
- Support for Emergency Operations



CHAPTER 06 AFFORDABLE HOUSING FOR ALL



CHAPTER 06

AFFORDABLE HOUSING FOR ALL

6.1 Introduction

In a rapidly growing city like Dhaka, housing comes up as a major problem. The genesis of the problem remains in the fact that the development of housing and related infrastructure hasn't cope with the growth of population. Government's lone effort in terms of resources, capabilities and initiatives is not adequate to resolve the ever increasing housing problem. As a result the gap between housing demand and supply becomes wider. Housing is a key factor in making Dhaka Metropolis a sustainable, affordable, livable and equitable city. With RAJUK area's population projected to grow from 15 million to 26 million people by 2035, providing suitable housing in the right locations is a strategic direction of this Revised Structure Plan.

6.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of existing housing and the new policies proposed in the Structure Plan.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Very high demand for housing. • Vibrant real estate market with existence of a large number of developers. • Adequate supply of locally produced building materials. • Existence of a National Housing Policy that sets a direction for the sector. 	<ul style="list-style-type: none"> • Increasing purchasing power of the people due to expansion of economy and inflow of remittance. • Provision of incentives to private sector developers for keeping a reasonable share of units in their projects as affordable housing units by means of cross-subsidization. • Promoting public-private partnership in provision of affordable housing for a greater population. • Promotion of low-cost building technology by House Building Research Institute. • Strengthening of House Building Finance Corporation for provision of Soft loans to low and middle income population.
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Scarcity of buildable land for affordable housing projects. • Absence of initiatives for directing real-estate development towards existing urban agglomerations outside core city of Dhaka. • Disobedience of private developers to land development and building construction rules. • Hassle and delay in approval of building plans by relevant authority. • Lack of capacity of public agencies such as RAJUK, NHA, HBRI, etc. • Failure to take up need based actions according to National Housing Policy to address housing crisis of low and middle income population. 	<ul style="list-style-type: none"> • Political instability • Very high rate of rural to urban migration resulting in mushroom growth of informal settlements. • Ever increasing demand for housing is pushing prices and rents of land and dwelling units beyond the reach of the majority of population. • Absence of a ceiling on land and real estate ownership and legalization of investing black money in purchasing real estate properties has skewed the market towards the better-off segment of the society. • High interest rate on bank credit. • Lack of adequate infrastructure and services to facilitate housing affordability.

Source: Compiled by RDP Consultants, RAJUK, 2014

6.3 Scenario Analysis

6.3.1 Existing Scenario Analysis

Dhaka is now growing at an unprecedented rate accommodating more than 600,000 people per year (CIA-The World Fact Book). About 65% of the Dhaka's population is due to migration. At this rate of migration, it is assumed that every year more than 120,000 dwelling units will be required to house the growing population.

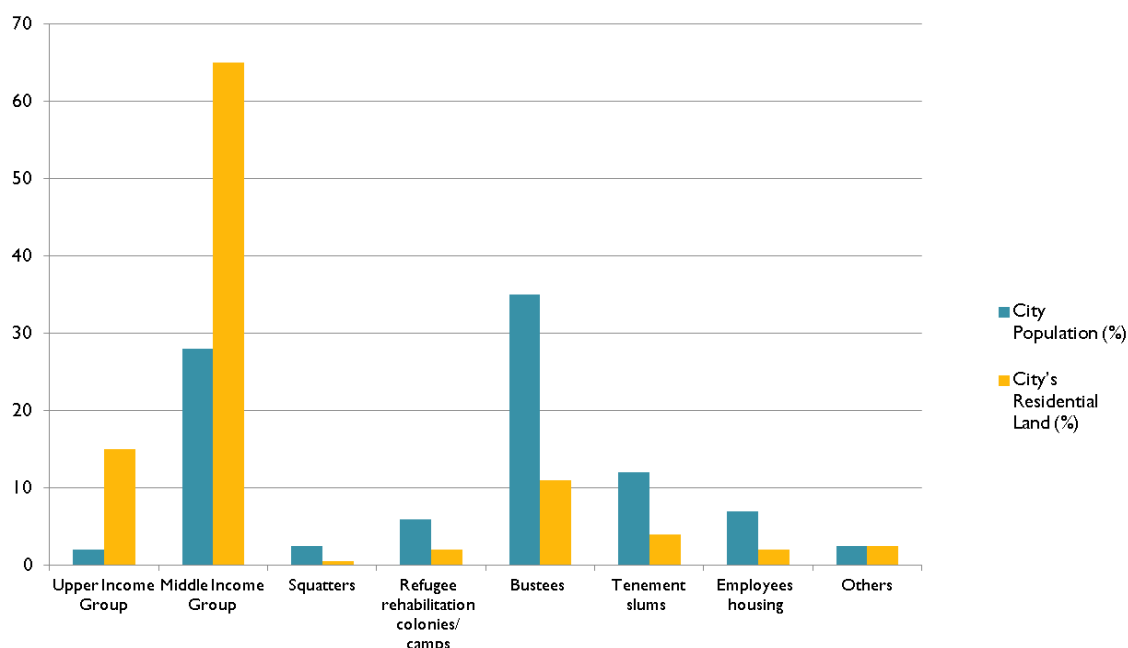
According to RDP Survey 2013, out of the total existing houses, 18.38% is pucca, 33.58% semi pucca, and 48.05% is katcha types which accommodate the lower level of the city dwellers.

The new structures that have been built since 2006, almost 95% is one storied, while structures with two storey's and above have grown for the entire RAJUK area with approximately equal rate of around 3%. Considering the scarcity of available flood-free lands within the metro Dhaka, there is no option, but to maximize use of the land resources by going vertical.

Almost 90% structures in RAJUK area is being used for residential purpose. While residential use is dominant by wide margin among all the uses in all regions, however, not all the regions have the same share of residential use. Among all the regions, the Central and Southern regions have the highest share of non-residential uses

a. Housing Provision

The rapid growth of Dhaka's population has also led to greater demand for housing units including land for housing. But the pattern of land ownership in Dhaka is highly skewed. More than 56% households have no land in the city. It does not, however, include the slum and squatter dwellers



(*bastuharas*). Had they been included, the figure would have been over 70%.

Figure-6.1: Land Occupancy by Different Group of People in Dhaka (Source: Islam, 1998)

Dhaka housing market currently serves primarily the upper and upper middle income households. So most of the people in the city do not own any land. Renting in unplanned urban periphery or squatting illegally is the only option available to them². The fact is that with a faster urbanization with limited expansion of urban space in a given geographical entity, more and more households tend to live in rented accommodations as possibilities of self owned accommodations shrink. **Figure-6.1** shows the share of land occupied by different group of people in the mega city.

b. Public Sector Contribution in Housing Supply

Both, formal and informal delivery system of housing exists in Dhaka where the share of formal system is comparatively smaller. Government can meet only 7% of the total housing demand, whereas private sector entertains the bulk of 93% and a significant percentage (55%) of the private sector housing is supplied by the informal sector (individual developer). Estimated even on a very conservative scale, roughly 25,000 housing units is supplied annually in Dhaka City by the private sector against a negligible amount contributed by the government. RAJUK is the leading public sector land development agency in Dhaka city supplying about 75% of the city's serviced housing plot by the public sector. It has developed some 13 townships /housing estate/site & services projects.

PWD builds flat for all categories of government employees. It shares approximately 9% of housing on subsidized rental basis within their service period. Defense Officer Housing Society has their own housing projects to facilitate accommodation for their officers in three locations within Dhaka City, at Banani, Mohakhali Mirpur and Baridhara. And recently a new housing area is being developed at Savar Cantonment area.

Infrastructure and service providing agencies, like, RAJUK, DCC, R&H, PDB, PWD, DWASA, and DPHE indirectly promote housing through provision of infrastructure and utility services. Development of roads, provision of power supply or drainage facilities and housing credit create a favorable condition for housing development. Some NGOs are working to provide better livelihood to the city poor.

c. Role of Private Sector in Housing Development

The private real estate companies emerged as housing providers in Bangladesh especially in Dhaka back in early 80s with residential apartment development. The growth was sluggish until the last decade but from the middle of 1990s the apartment development got a boost. At the beginning there were less than 10 developers, the number increased to 42 in 1988. In 2000, there were about 200 companies in this sector. Now in 2014, the total number of real estate companies is more than 1500 (REHAB, 2014).

Now it is one of the major industries in the country contributing 12-15% of National GDP with about 5 million skilled and unskilled human resources are directly involved in this sector. Out of annual supply of about 25,000 housing units, private real estate companies contribute more than 17000 units. The private land development companies are also engaged in developing various land based housing projects, through which they supply serviced plots. They are actually now playing the lead role in the supply of serviced housing land.

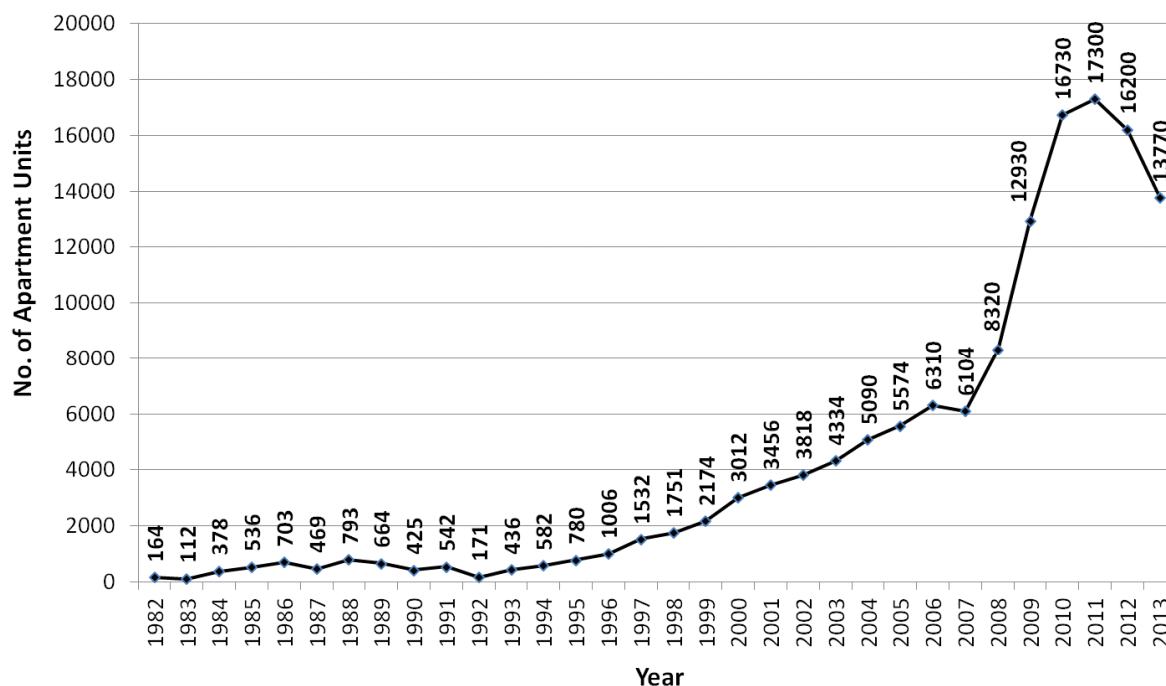


Figure-6.2: Contribution of Real Estate Developers in Housing Sector from 1982-2013

(Source: Seraj, 2014)

d. Housing for Low Income People

Housing is the most immediate need of these migrants. As most migrants belong to the disadvantaged group of the society they live in low cost dilapidated and shanty houses. As a result large slums and squatters have developed in the city. About 3.5 million low income people are living in 4000 slums and squatters in Dhaka city. There are also about 52,000 (BBS 2011) floating people in the mega city without having any shelter. They live under the open sky, on the footpaths, in the railway stations, launch ghats, bus terminals, building stair cages or any other uncommon places. They are the most deprived section of the Dhaka's urban community.

City's low income groups receive a minimal share of RAJUK's land allocation. In Purbachal project only 4.3%(110.46 acres) of land has been reserved for the low income groups, in Uttara 3rd Phase the share was only 7.5% (40.51 acres) and in Jhilmeel Project the allocation for the low income was only 1.2%. However, the price and the mechanism determined for allotment of land is hardly accessible by the lower income people. NHA has so far succeeded in providing 15,704 housing units to the lower income groups, but its recent projects are not been not affordable to the urban poor. Every year there is a shortage of housing supply especially to the low income groups. As a result disadvantaged people are compelled to live in degraded housing in vulnerable areas.

e. Housing Crisis in the Main City and the Need for Decentralization

There is acute shortage of housing in the core Dhaka, particularly for the middle and the low income groups. Failing to afford standard housing, some families are forced to live in low graded houses. Other families, intending to live in a quality accommodation spend substantial part of their monthly income for housing sacrificing other needs. Low income families work, both, in the formal and informal sectors. Most of the men working in informal sector. Many leave their families back in the village homes as they cannot afford to have housing in the city to bring their families.

If economic activities can be decentralized and a part of the employment centres can be shifted to smaller urban sub-centres in the city periphery demand for housing will also be shifted to those places.

This will reduce demand for housing in the main city. As many houses will be released in the main city rent will come down. This calls for developing infrastructure and services in the peripheral urban centres to attract investment in housing those areas. Government can build subsidized shelters for low income and floating people in the city periphery as there will be sources of employment after economic decentralization. These shelters can be built at lower cost as the price in the periphery is much lower compared to the main city.

6.3.2 Future Scenario and Potential

a. Housing Need Estimation

Housing need reflects the actual requirement of housing for a particular size of population, while housing demand usually reflects the amount of housing for which the population is able and willing to pay. To bridge the gap between the housing needs and the effective housing demands, financing should play a crucial role. In fact, the increase in housing supply becomes meaningless unless they are met with effective demands that can purchase them. Vigorous and diverse public financing schemes need to be devised and made available for the improvement in housing situations.

The population for Dhaka City in the year 2035 is estimated to be about 26 Millions. Dhaka City core area is already overcrowded with an average density of more than 700pph. In Dhaka presently number of dwelling units added per year is about 25,000 which is far less than the required number. According to BBS data, the backlog of dwelling units in 2015 will be 0.76 million (**Table-6.1**).

The housing need assessment process consists of three main components. These are, growth of new households, shortage of existing dwelling units and replacement of old and dilapidated dwelling units. Creation of new families out of existing population and arrival of new households through migration make up the new households. The shortage of units is simply the existing backlog of unmet housing needs.

Replacement of housing units is required because every year some part of the existing housing stock (especially the semi pucca and katchas) wears out and calls for replacement or upgrading. Therefore, replacement of 20% of the existing housing stock is added to estimate the future housing unit requirement.

Aggregated Household Method is the simplest and widely used approach to forecast the housing need. This method estimates the forecasted household number. The forecasted population (P) is divided by the forecasted average household size(S) to produce the forecasted number of housing requirement (H). So, $H = P/S$.

Using this formula the future housing need has been calculated with 5 year interval upto the year 2035 (**Table-6.1**). At the end of the plan period demand is expected to be about 1.26 million. Timely and effective measures are required to be taken by both public and private sectors to accelerate the supply of housing stock at affordable price for all income groups of the projected population of 25.94 million populations by the year 2035.

Table-6.1: Housing Need Estimation for RAJUK area upto 2035 (in millions)

Region	Population/ Demand	Year					
		2010	2015	2020	2025	2030	2035
Central Region	Population	8.61	9.76	10.83	11.76	12.46	13.05
	Household	1.88	2.11	2.36	2.63	2.87	3.07
	Demand	0.41	0.46	0.51	0.45	0.63	0.67
Northern Region	Population	1.58	2.09	2.60	3.11	3.55	3.91
	Household	0.39	0.5	0.66	0.84	1.05	1.28
	Demand	0.07	0.09	0.11	0.14	0.18	0.22
Eastern Region	Population	0.60	0.66	0.73	0.83	0.95	1.08
	Household	0.14	0.15	0.17	0.19	0.21	0.23
	Demand	0.03	0.02	0.03	0.03	0.03	0.04
Southern Region	Population	1.91	2.22	2.50	2.76	2.97	3.15
	Household	0.45	0.52	0.6	0.68	0.76	0.82
	Demand	0.07	0.09	0.1	0.11	0.13	0.15
South-Western region	Population	0.77	0.87	0.95	1.06	1.18	1.31
	Household	0.17	0.19	0.22	0.25	0.28	0.31
	Demand	0.03	0.03	0.04	0.04	0.05	0.05
Western Region	Population	1.25	1.73	2.21	2.69	3.11	3.44
	Household	0.33	0.42	0.54	0.65	0.74	0.81
	Demand	0.07	0.07	0.09	0.11	0.12	0.13
Total	Population	14.73	17.32	19.82	22.21	24.22	25.94
	Household	3.36	3.89	4.55	5.24	5.91	6.52
	Demand	0.68	0.76	0.88	0.88	1.14	1.26

Source; Population Census 2011 & Compiled by Consultant, RDP

*Household size in 2011 was 4.51 where as it is expected to be lowered to 4.01 in 2035 through government effective population planning and motivational measures.

6.4 Critical Issues

Following are the critical issues observed in the Dhaka's housing sector.

a. Deprivation of the Low Income People in Respect of Housing Provision

Both, public and private sectors are playing apathetic role in addressing the housing needs of the low income city dwellers. Despite recommendations in several plans and reports, no plausible measures were evolved by the public sector housing agencies to provide adequate housing to the urban poor, so housing need of a large section of the urban dwellers remains unfulfilled.

b. Inappropriate Initiative to Meet Housing Need

Public sector housing agencies, like, RAJUK stresses more on supply of serviced plots that takes a long time to convert into real house. Many allottees do not go for immediate housing construction for many reasons. As a result no housing units are added to the housing supply from the land based housing projects for long. Instead, provision of supply of ready apartment could have been a better response to address the housing need.

c. Lack of Diverse Housing Financing Schemes for Needy Households

Housing, perhaps the single most expensive asset a family can own in its lifetime, seldom falls within the reach of average households. Unfortunately, housing financing is relatively undeveloped and rather limited at the moment for all income groups.

d. High Land Price Limiting Access to Housing

Since majority of the city dwellers belong to middle and low income groups, they cannot afford house in the city amid constantly rising land price.

e. Absence of Infrastructure in Potential Housing Areas in the City Fringe

Because of high land price in the main city a large section of the people target city fringe areas for their housing. But they are unable to build houses because of absence of infrastructure in most of the city fringe areas.

f. Lengthy and Cumbersome Process of Planning Permission

According to Building Construction Act, 1952 before development of any housing unit the building has to be got approved from RAJUK. But the current process of approval is lengthy and cumbersome. This often delays production and supply of housing leading to crisis in housing supply.

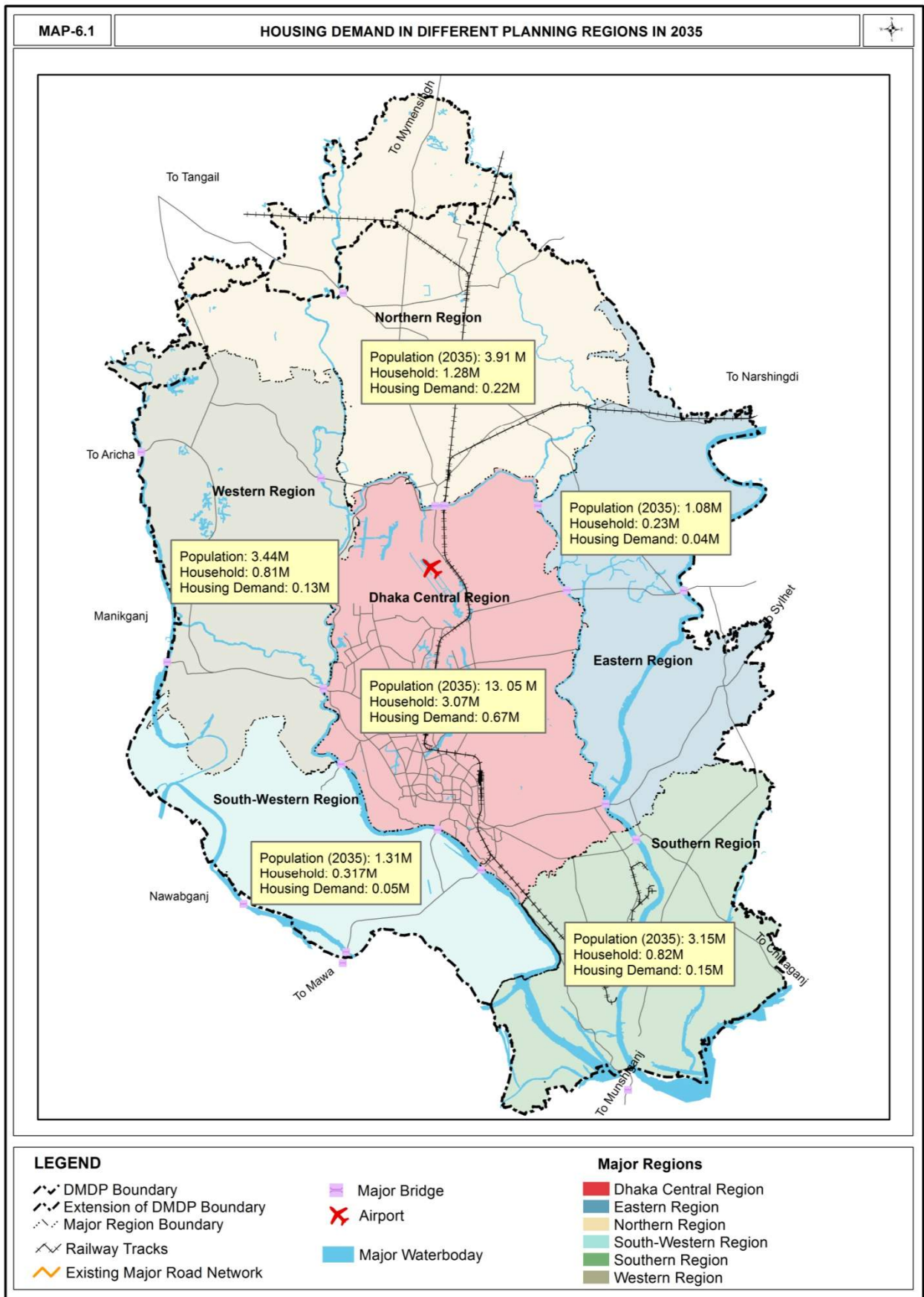
g. Lack of Affordable Housing

Affordable housing refers to dwellings which households with low-to-moderate incomes can afford, while meeting other essential living costs. Under the current market price of housing over 78% of the lower middle income group and 70.73% of the middle income group families cannot afford housing in the city (**Table-6.4**).

Table-6.2: Affordability Level of Different Income Groups of People

Affordability level	Lower Middle-Income Group %	Middle Middle-Income Group %	Upper Middle-Income Group %
Affordable	4.88	21.95	47.97
Unaffordable	78.05	70.73	52.03
Severely unaffordable	17.07	7.32	0

Source: Jahan and Kalam (2012)



6.5 Future Plan and Direction

As future directions for housing promotion the following goal, objectives and policies have been set.

6.5.1 Goal

INCREASE THE RANGE OF AFFORDABLE AND APPROPRIATE HOUSING OPPORTUNITIES FOR LOW TO MODERATE INCOME.

Apart from providing shelter, for most people affordable housing is the foundation for life's opportunities and a doorway to success. But many households are finding this goal difficult to secure, with the problem most acute amongst those on low-to-moderate incomes. This comes on top of a long-term decline in affordability, an emerging gap between supply and demand at the low cost end of the market, and an overstretched public housing system.

6.5.2 Objective and Policy

Considering the present scenario of Dhaka's housing sector, future need and the critical issues, the RDP has set the following objectives and policies to attain the goal of housing development

OBJECTIVE-HN 01: TO INCREASE HOUSING SUPPLY

Presently, there remains huge gap between housing stock and population growth. There is an annual housing shortage of 0.24 million units (BBS Census 2011); more than 120,000 new households need to be housed annually against present yearly total housing unit addition is only 25,000 units (SFYP). Vigorous endeavor is needed to meet the housing need for the projected population of 2035. Housing supply must commensurate with the housing need caused by increasing population that must also be livable to ensure health and security of the dwellers.

Policy-HN/1.1: Promote Infrastructure and Services in the Potential and Designated Housing Areas

This approach is necessary to enable developers to develop housing in their lands in potential and designated housing areas. This in turn will increase housing supply.

- **Strategic Action:**
 - Establishment of fast and effective connectivity.
 - Extension and assurance of basic urban services.
- **Implementation Tools:**
 - Take up programmes and projects for establishment of effective regional connectivity through fast mass transit.
 - Take up programmes and projects to provide utility services to potential residential areas in advance.
 - Provide good access to public transport and a wide variety of services and amenities in advance from potential housing areas.
- **Implementing Agency:** RAJUK, NHA, LGED, DTCA.

Policy-HN/ 1.2: Ensure Adequate Supply of Land for New Residential Development

- **Strategic Action:**
 - Adoption of participatory housing land development approach and advance acquisition of private land in suitable locations for housing development.
- **Implementation Tools:**
 - Undertaking Land Readjustment and Guided Land Development, Community Mortgage Programme (CMP) method based housing projects in fringe areas by public sector housing agencies.

- Creation of stock of housing land by making compulsory acquisition of land in potential and designated housing areas avoiding valuable agricultural land.
- Dilapidated Government owned quarters may be destroyed and rebuild high rise apartment to provide more housing to government employees;
- Provide housing close to the job locations for major industrial clusters;
- Development of Housing estate is strictly restricted in disaster prone and conservation areas.
- **Implementing Agency:** RAJUK, NHA, and LGED.

Policy-HN/1.3: Devise Effective and Workable Housing Financing Mechanism

To transform the housing needs into actual demand, and to enhance the opportunities of decent housing for the modest income families, diverse forms of housing finance should be devised and made available for both, public and private sectors. Particularly, government finance institutions should consider preference rates for the needy families on long-term bases. This is also in line with the suggested policy above (**Policy-HN/2.4**).

- **Strategic Action:**
 - Government need to create diverse forms of housing finance schemes utilizing experiences from other countries
 - Revitalize and reinforce the functions of HBFC to housing finance as a demand side measure.
- **Implementing Tools**
 - Conduct study to explore new and innovative housing finance;
 - Based on the recommendations from the study, mobilize all the available resources to provide financing for housing purposes.
 - Consider preference rates for the eligible households on long-term bases.
 - Provide soft loans for individual housing builders who want to have their own houses, but unable to do for scarcity of capital;
- **Implementing Agency:** RAJUK, Ministry of HPW, Ministry of Finance and Bangladesh Bank.

Policy-HN/1.4: Expedite and Ease Planning Permission to Increase the Rate of Housing Supply

Easy and smooth building plan approval process will increase the rate of housing construction resulting in increase in the supply of houses.

- **Strategic Action:**
 - Ease legal and procedural processes of building design approval.
- **Implementation Tools:**
 - Establishment of one Stop Service Center by RAJUK for prompt development permission.
 - A transparent and accountable system should be developed to reduce suffering of the service seekers.
 - It should also try for as much as possible automation of the approval process.
 - City Corporation and Pourashavas may be involved in according development permission after sufficient institutional strengthening.
 - Permit development of houses of certain level without formal approval, but following BC Rules and DAP Landuse. Enforcement of rules can be ensured through inspection.
- **Implementing Agency:** PWD, LGED, RAJUK, City Corporations and Pourashavas.

Policy-HN/1.5: Public Sector Housing Agencies should Play Greater Role as Housing Facilitator Instead of Housing Provider

Public sector housing production and supply process is lengthy and often mismanaged. Besides, public sector has so far failed to address the housing need of all income groups. As facilitator, public sector should promote infrastructure services and create a positive investment climate for investment in housing by the individual developers and commercial housing companies. It will expedite the housing supply.

- **Strategic Action:**
 - Public and private sectors should emphasize less on direct housing and more on facilitating housing by the private sector.
- **Implementation Tools:**
 - RAJUK and NHA should take up programmes and projects to develop infrastructure in potential city fringe areas and facilitate individual land owners and commercial developers to develop housing.
- **Implementing Agency:** RAJUK,NHA,LGED

Box-6.1

Need of Standard for Block Based Housing Development

Lately, some real estate companies are undertaking cluster type block based apartment development projects around Dhaka city, where a number of multistoried buildings are developed in a site. Some of these projects are in the very close to the city heart and others are in peripheral areas, for example, Japan Garden City in Mohammadpur, Rupayan City in the periphery of Narayanganj town, Lake City Concord in Khilkhet, Multiplan City in Mirpur-1, and Proboni Ridgedale of Navana in Murpur-11 etc. This kind of compact housing development is appreciable in a land scarce city like Dhaka. These projects are virtually creating high density clusters. But in most cases these are jumbles of concrete structures devoid of adequate community facilities including open space. Most of these projects are monotonous to look, they lack ventilation and deprive the dwellers of enough breathing space. Livability and healthy environment is mostly absent, as there is very little or no provision of space community and recreational.

Interestingly, current building construction rules do not contain any regulations for controlling this kind of developments. RAJUK should immediately embark on preparation of standards and rules for block based development ensuring community and open space facilities based on the number people inhabiting in the area.

OBJECTIVE-HN 02: TO ECONOMISE USE OF HOUSING LAND

Bangladesh is the highest density country in the world where land for housing is fast shrinking against rapidly growing population. Open land is fast shrinking in RAJUK area amid rapid urban growth. Land utilization should be economized so that land may be made available for other activities including infrastructure, open space and socio-economic activities.

Policy-HN/2.1 : Encourage Block Housing Concept

This approach is direct intervention to meet housing need compared to plot allotment approach, where the land owner often keeps the land unutilized for long, sometimes with the motive to gain benefit through land speculation. Plot based development is sometimes inflexible, monotonous, and inefficient whether block development is mostly flexible, various and efficient in nature and maximizes use of land.

- **Strategic Action:**
 - Adoption of the block housing policy by both public and private sector housing agencies.
 - Integration of the concept in Private Residential Land Development Rules, 2004;
- **Implementation Tools:**
 - Develop standard in collaboration with RAJUK,NHA and professional groups and incorporate them in BC Rules through gazette notification;
 - Real estate developers may be provided easy credit incentive for development of block housing development.
 - RAJUK could take pilot project to implement block housing around MRT and BRT Stations;
 - Special financial incentives for commercial real estate companies for block housing development.
- **Implementing Agency:** RAJUK, NHA, PWD, and REHAB.

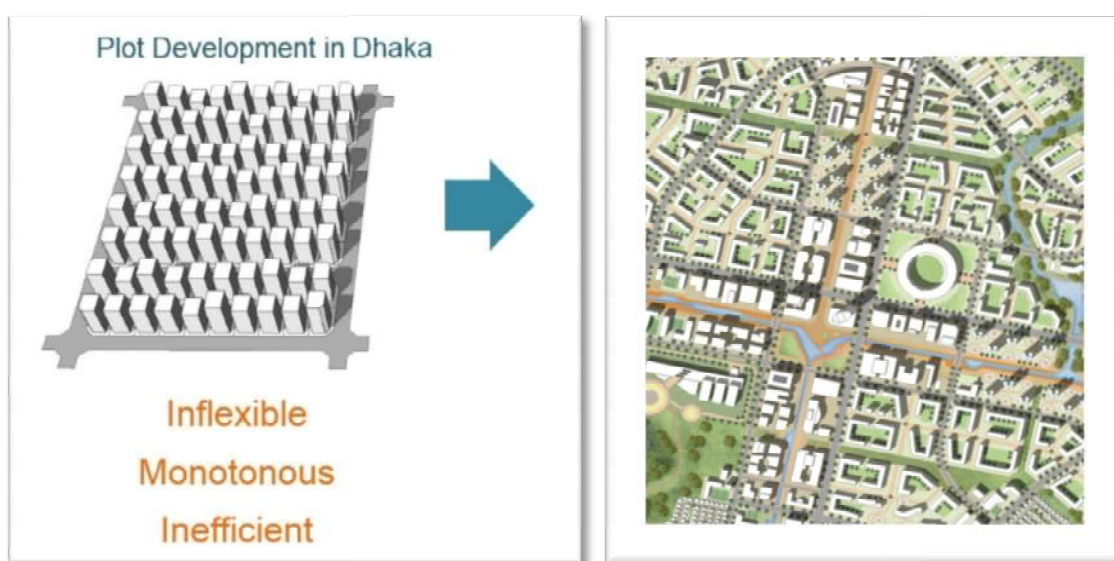


Figure-6.3: Concept Diagram of Block Housing Development (Plot and Block Development)

Policy-HN/2.2 : Discourage Plot Based Housing Development Practice both, by Public and Private Sector Agencies

Amid severe scarcity of land, allotment of land for housing deprives many others from housing space. Instead, it is better to utilize lands for apartment development where many families can be accommodated.

- **Strategic Action:**
 - Public and Private housing agencies should be refrained from taking up any more plot housing projects.
- **Implementation Tools:**
 - Discouragement to plot based housing should be incorporated in the national housing policy.
 - To discourage housing companies dealing with plot based projects higher sales tax and VAT may be imposed.
- **Implementing Agency:** Ministry of Housing and Public Works, RAJUK, NHA, NBR.

OBJECTIVE-HN 03: TO DEVELOP HOUSING WITH EASY ACCESS

Intensification of residential development around high capacity rapid transit stations will ensure easy to high quality and fast public transport by people of the going to work places. This kind of development is known as Transit Oriented Development (TOD) that features vibrant streetscapes, pedestrian-oriented built forms and land use characteristics that make it convenient and safe to walk, ride and use public transport. Bring compact, mixed-use development within walking distance of high capacity rapid transit. Frequent fast, and reliable high capacity rapid transit reduces dependence on personal motor vehicles and unofficial transports such as a rickshaw.

Policy-HN/3.1: Encourage to Develop Housing Close to the Transit Stations

- **Strategic Action:**
 - Develop infrastructure and services around transit points.
 - Public sector housing agencies should take up housing projects close to transit points.
- **Implementation Tools:**
 - Identify the Mass Transit Stations for Transit Oriented Development that would be detailed out in the Detailed Area Plan(Sample diagram has been presented in **Figure-6.4**);
 - RAJUK and NHA should develop its own apartment projects in these locations and encourage the private developers.
- **Implementing Agency:** RAJUK, NHA, Donors, NGOs, Employers, and REHAB.

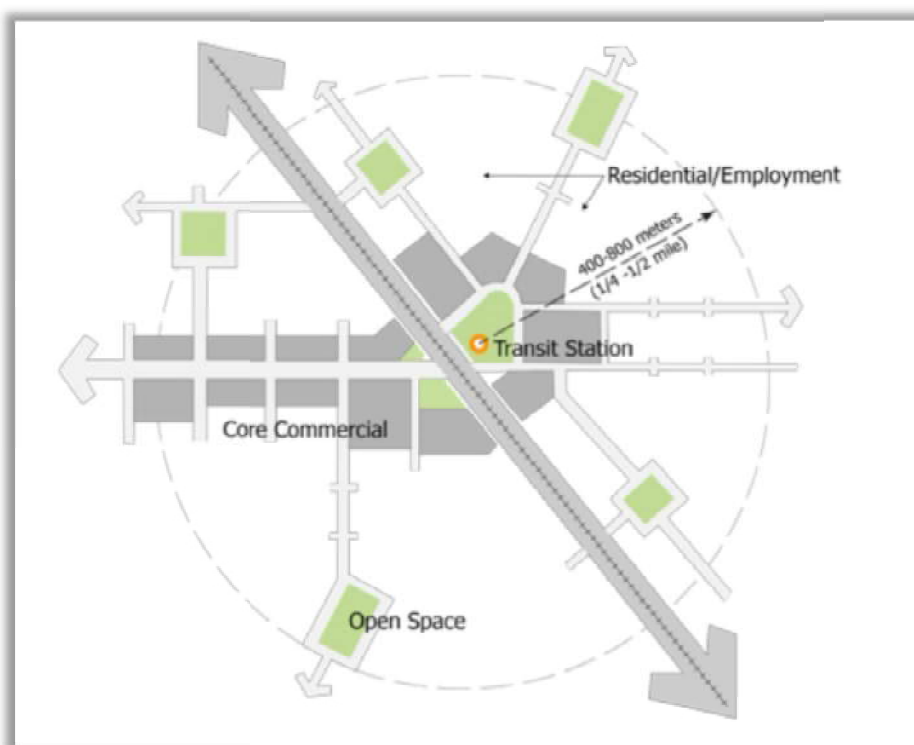


Figure-6.4: Concept Diagram of Transit Oriented Development (TOD)

Policy-HN/3.2 : Encourage Housing Development within the Designated Urban Centers

To defuse housing development from core to the outer urban areas the regional and sub-regional urban centres should be enabled to have new housing development.

- **Strategic Action:**
 - Develop adequate infrastructure and services in regional and sub-regional urban centres;
- **Implementation Tools:**
 - Develop more roads, install water supply network, gas supply network and drainage system in regional and sub-regional urban centres.
 - RAJUK should take up new secondary and primary road development projects.
 - RAJUK and NHA can develop apartment projects and create a demonstration effect on the private developers.
- **Implementing Agency:** RAJUK, NHA, LGED, DWASA, and REHAB.

OBJECTIVE-HN 04: TO INCREASE LOW AND MIDDLE INCOME HOUSING SUPPLY

RAJUK and NHA are the paramount public sector housing development agencies in Dhaka city providing housing lands and apartments. However, mostly the upper and upper middle income groups are benefited from their housing projects. City's low income groups receive a minimal share of their housing (see **section 6.2.1**). RAJUK in Purbachal project reserved only 4.3%(110.46 acres) for the low income groups, in Uttara 3rd Phase the share of the poor was only 7.5% (40.51 acres) and in Jhilmeel Project the allocation was only 1.2%. Even the mechanism for allotment of land is not attainable by low and income classes. NHA had some success in providing low income housing, but its recent projects did not create any opportunity for the urban poor. This is creating social injustice. To address affectively the housing need of the urban poor government housing organizations should have more provision of housing for them with secure tenure.

Policy-HN/4.1 : Public Sector should Provide Affordable Housing to the Low and Middle Income Groups

The poor and the middle income groups are not able to have housing from the market, as the real estate companies operate purely on profit basis. It is only government who can provide housing on terms and conditions affordable by the poor and the middle income groups.

- **Strategic Action:**
 - Evolve mechanism to deliver housing to the low and middle income groups at affordable rate.
- **Implementation Tools:**
 - Low rent high rise (10-12 storied) Public Housing projects for low income people near working place, CBD, and around TOD area;
 - Land in the eastern periphery alongside the Hazrat Shahjalal (R :) International Airport could be used for low rise low income housing;
 - Public rental housing projects for Government and Private employees;
 - Provide housing credit to the low to middle income group at affordable rate of interest;
 - Provide housing to the low to middle income group on long term hire purchase basis.
 - Provide funding for research on affordable housing for the poor.
 - Provide housing credit to low paid Government employees.
 - RAJUK should take up programme to implement low income housing projects in areas designated by DAP for low income housing.
 - NHA and RAJUK may take up low cost apartment projects near selected industrial sites like, Ashulia, Hemayetpur, Konabari, Gazipur.
 - Appropriate mechanism has to be developed to ensure,
 - i. housing units going to the target group , and
 - ii. allottees are able to afford the housing units.
- **Implementing Agency:** M/O Land, RAJUK,NHA, Ministry of Finance, Bangladesh Bank

Policy-HN/4.2 : Improve Conditions in Slums

Improvement of slums will improve living condition of the urban poor. Contract may be reached with slum owners that rent will not be raised for a particular period of time. Exercising of the rent control provisions of the Rent Control Act may be applied to prevent house owners to indulge in exploitative measures against the tenants.

- **Strategic Action:**
 - Policy decision taking up slum improvement project by RAJUK,NHA, City Corporations, Pourashavas.
 - Work out together with the squatter and slum communities the ways to improve the living conditions on site or at more appropriate location elsewhere;
- **Implementing Tools:**
 - RAJUK, City Corporations, Pourashavas can take up slum improvement projects in collaboration with private slum owners.
 - Fund may be procured from the donor, GoB or agency's own source.
 - The slum owners must agree that they would not raise house rent for next five years.
 - Exercise legal powers under **House Rent Control Act 1991** to control house rent in favor of tenants.
 - Publicize important provisions of rent control for information of house owners and tenants.
- **Implementing Agency:** RAJUK,NHA, Urban Local Governments.

OBJECTIVE-HN 05: TO ENSURE DEVELOPMENT OF HEALTHY AND LIVABLE NEIGHBOURHOOD

For better, living there is need to enhance the livability in residential neighborhoods by upgrading the quality of development and improving the quality of the public realm.

Policy-HN/5.1: Create Planned and Environmentally Sound Housing Neighbourhood in the Potential Urban Areas

Neighbourhood is a kind mahallah having distinctive entity and where local level day to day services and facilities are available. Neighbourhoods are developed through systematic planning.

- **Strategic Action:**
 - Devise standard rules for healthy and livable neighbourhood.
 - Public and private sector housing agencies should abide by the approved rules of designing healthy and livable neighbourhood.
- **Implementation Tools:**
 - RAJUK and NHA, as public sector housing agencies should devise the conditions of healthy and livable neighbourhood and follow them while designing their own housing layouts.
 - Determine the appropriate urban design elements at the neighborhood level, such as sidewalk width and materials, street lights and trees, and other street furniture.
 - Promote the undergrounding of utilities and service lines.
 - Neighborhood traffic management strategies to prevent traffic from nearby developments and regional traffic growth from intruding upon residential areas.
 - Create 'the Community Neighborhood' to connect with Housing, Schools, Community facilities, and Parks (Sample diagram has been presented in **Figure-6.5**).
 - Neighborhood Development scheme can be used to revitalize existing town centers and neighborhoods or build new ones at transit nodes and in other locations. Future public transit stops are important places to consider during the Detailed Planning stages (DAP) to maximize access to alternatives forms of transport (**See BOX-6.2**);

- Introduction of Pedestrian Oriented Development (POD), in regional centers, sub-regional centers and community centers and rural areas (Sample diagram has been presented in **Figure-7.6** and **Box-7.3**);
 - Neighbourhood should include a dense network of walking and cycling routes results in short, varied and direct connection that improved access to schools, community, services and public transport.
 - Hospitals would be provided with a green buffer zone to make healthy residential area;
 - Sufficient greenery and waterbody should be there to enhance livability.
 - There should be provision of mix of functions; community spaces formation through complex public facilities.
- **Implementing Agencies:** RAJUK, NHA, Bangladesh Land Developers Association (BLDA).

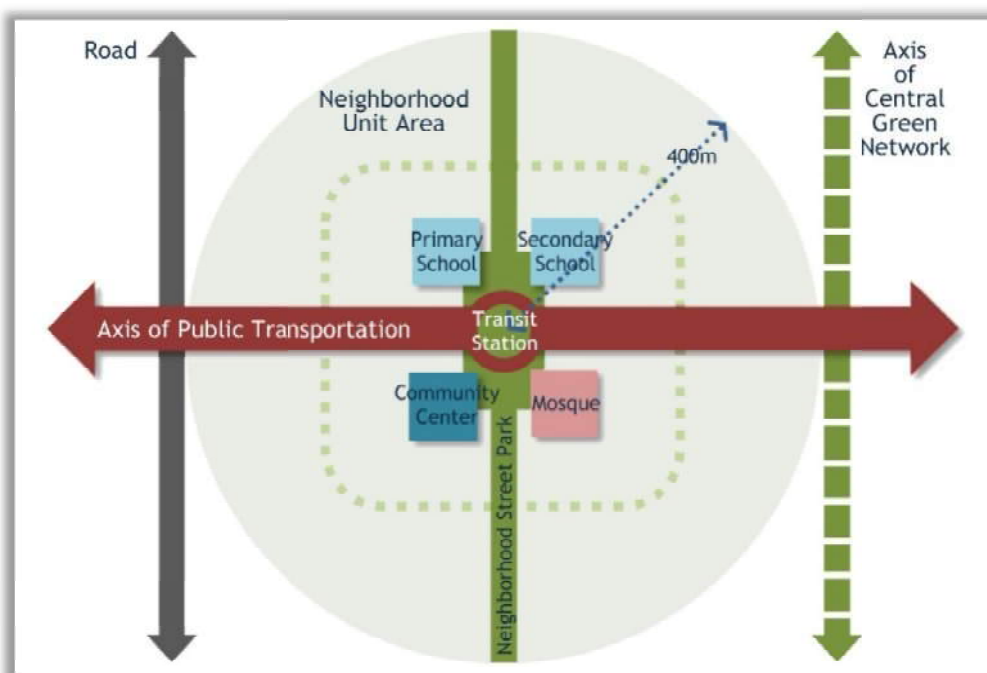


Figure-6.5: Concept Diagram of Community Neighborhood



Figure-6.6: Concept Diagram of Pedestrian Oriented Development (POD)

Box-6.2**Neighborhood Development Concept (NDC) in Smart Shape**

NDC, also known as new urbanism, neo-traditional, includes a variety of housing types, a mix of land uses, an active center, a walkable design, and often a transit option within a compact neighborhood scale area either as infill in an existing developed area or as a neighborhood scale project. Automobile dependence design practice results in the loss of community vitality and makes neighborhoods unwelcoming to pedestrians and bicyclists. It also increases traffic on the street leading to congestion. However, zoning utilizing NDC concept mixes land uses in a compact area can achieve a high quality neighborhood. NDC can guide new development patterns that are civic-oriented, pedestrian-friendly, economically vibrant, environmentally sustainable, diverse housing types, and evoke a unique sense of place.

NDC is based on the principle that neighborhoods should be walkable, affordable, accessible, distinctive, and true to the significant historic context of each community. NDC must be distinguished from Transit Oriented Development (TOD), NDC need not focus as close on transportation areas and parking as components of urban design.

Development on Greenfield sites located in rural settlement areas can be guided by NDC principles in order to minimize environmental impacts associated with new development. A more appropriate use of NDC may be re-established or expand existing village centers or growth center of community life.

The NDC principles and objectives of particular importance are:

- Sustainability
- Compact Development
- Mix of Uses
- Accessibility and Transportation
- Cultural and Environmental Context

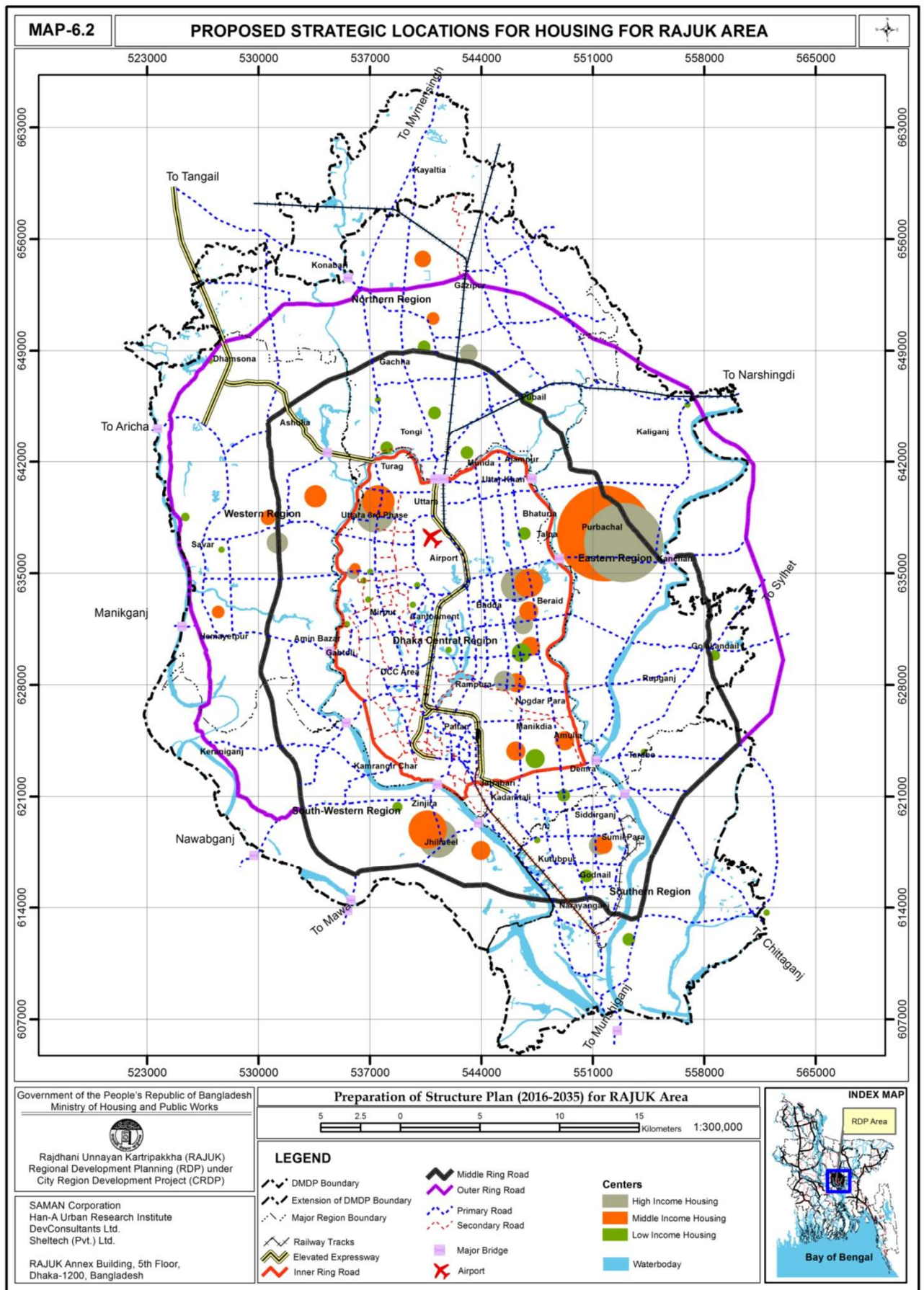
Generally, NDC is neighborhood in scale, 10 to 15 acres in area based on the geometry of a 1/4-mile maximum walking distance. Open space is typically 10% to 20% of the area, and about 70%-80% of the area is devoted to residential blocks, with the remainder (approximately 10%) as mixed use with a focus on viable commercial space and civic functions. NDC requires dense (e.g. quarter-acre and smaller lots) residential blocks in order to create an internally-oriented neighborhood with enough people to help support the commercial and civic functions. NDC neighborhoods are carefully designed to function in ways that provide a high quality of life.

Box-6.3**Pedestrian Oriented Development (POD)**

Pedestrian Oriented Development (POD) is a pedestrian friendly policy providing clear, comfortable pedestrian access to commercial and residential areas and transit stops. POD is employed through a combination of land design practices, including compact development, mixed-use, traffic calming, pedestrian – and public transit-orientation, and a mix of housing types. POD method may work well in community centers and sub regional centers. It also can be applied successfully in rural and suburban areas.

New Housing and commercial developments should incorporate pedestrian circulation into site layouts by providing not only sidewalks and walkways, but also human-scale landscaping, lighting and other features that promote a sense of safety and encourage people to make use of pedestrian amenities.

POD design can help support a community's economic, environmental, human, and social health goals, by promoting human-scale development consistent with the community's vision



CHAPTER 07 ENHANCING DHAKA'S EMPLOYMENT AND PRODUCTIVITY



CHAPTER 07

ENHANCING DHAKA'S EMPLOYMENT AND PRODUCTIVITY

7.1 Introduction

Economy is the foundation of urban agglomeration and eventual progress of an urban community. The location decision of urban economic and residential units reflects intention to benefit from agglomeration economies. But current agglomeration in Dhaka City is not generating expected level of return for lack of infrastructure and services. Taking Dhaka to its due level of prosperity requires making it more productive and functional. This chapter focuses on where and how to provide the major economic activities of Dhaka for attaining the goal of making Dhaka economically more functional and productive.

7.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of Dhaka's employment and productivity.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Dhaka is the central location in the country; • Steady growth of export oriented sectors. • Informal Sector as the largest employment provider. • Strong tendency to self-reliance for development finance. • Tarabo and Rupganj areas are famous for handloom, especially for the manufacturing of famous Jamdani Saree. It will help substantially to strengthen economic base of the people of this area; • Growing service sector; • Economic agglomeration. 	<ul style="list-style-type: none"> • Competitiveness • Locational Advantages • Increasing remittance from abroad. • Increasing growth of export earnings. • Cheap labour force. • Excellent port facility and storage capacity help develop trade and commerce of Narayanganj area; • Jamdani Saree village can also become a tourist spot of significance. • Comparatively better infrastructure.
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Poor infrastructure and services. • High interest on bank credit. • Absence of export diversification. • Traffic congestion and delay in movement. • Limited supply of land and high land price. 	<ul style="list-style-type: none"> • Political instability

7.3 Scenario Analysis

7.3.1 Current Economic Base & Diversity

a. Dhaka's Primacy in National Urban Structure and Economy

Dhaka's high primacy was inevitable in view of:

- Dhaka's central location in the country;
- Its status as a capital of a unitary state; and
- Dynamic interactions among the demographic fundamentals and forces of economic, market and globalization that have defined the supply and demand sides of unabated Dhaka bound migration.
- Dhaka's primacy is evident in the fact that it shares,
 - a) 36 % of the total urban population,
 - b) 36% of national GDP,
 - c) 31.8% of total employment, and
 - d) 43.6% of total formal employment of the country.

b. Employment Distribution

In 2002, the first five-ranking industries were: textiles, furniture, food & beverage, plastic products and leather. In the same year, by employment, the first five-ranking industries were: wearing apparel, textiles, furniture, food & beverage and leather. The data of 2005 do not show big change in ranking order. However, two noticeable additions in five key types of industries in 2005 are non-metallic and chemicals, by employment.

Table-7.1: Job Distribution by Types of Industries in Dhaka

Job Category	Number of Jobs	Percentage
Primary /Agriculture	1,457,093	25.60
Secondary /Manufacturing	599,640	10.54
Tertiary		
Utility Service	20,576	0.36
Construction	220,374	3.87
Transport	331,079	5.82
Hotel and Restaurant	35,039	0.62
Business	1,015,771	17.85
Service	160,415	2.82
Other	1,850,714	32.52
Total Job	5,690,701	100.00

Source: Kabir (2013, p.142).

c. Informal Employment

A large portion of the Dhaka's economy is based on the informal sector which provides employment for a significant number of people. Rickshaw operators, street vendors, and hawkers form a major part of the informal sector with over 400,000 rickshaw drivers alone. Nearly half of the lower income group finds employment through household work and other forms of unorganized labor.

The earliest estimate made by World Bank in 1981 put Dhaka's informal employment to 65% of total employed labour (cited in Amin, 1982). Labour Force Survey data by BBS are reported by district and division. Therefore, estimates for Dhaka city/metro's informal sector remain imprecise. Even with such high rate of informal employment, Dhaka possesses the lowest share among all the divisions.

Table-7.2: Proportion of Employed Population by Geographic Division

Geographic Division	Formal	Informal
Sylhet	8.8	91.2
Rajshahi	7.0	93.0
Khulna	9.2	90.8
Dhaka	15.7	84.3
Chittagong	13.5	86.5
Barisal	11.3	88.7

Source: ADB-BBS (2012, p. 12).

Limited growth of manufacturing jobs and widespread use of subcontracting practices and outwork have given rise to household-based economic activities and temporary units. Poverty, inability to acquire necessary formal education and training and limited growth of employment in the formal sectors compel large incoming migrants to depend on whatever income earning opportunities open in a mega-city environment. These changes are contributing to the growth of the informal sector particularly in a city like Dhaka.

Box-7.1

TREND OF WOMEN INVOLVEMENT IN THE INFORMAL SECTOR

The growth rate of female workforce per year is three times higher than their male counterparts. The annual rate of increase in informal sector, for male, was 4.27 percent from 22.7 million in 1999-2000 to 32.4 million in 2010, whereas female employee has grown from 6.6 million in 1999-2000 to 14.9 million in 2010 with a rate of 12.58 percent per annum (Ali, 2013). The higher rate of increase in the participation of women in the informal sector might be the result of their lower education, training, skills, assets and access to market information compared to their male counterparts.

Research (Shams, 2014) further shows that the women are more employed in the relatively marginal occupations of the informal sector, e.g., working as house maids, full time, and increasingly more engage themselves for 'suta kaj', specific work, e.g., cleaning and washing of clothes, on an hourly basis.

d. Employment-Investment Linkage

Availability of diverse labour force and professionals is the major reason for choice of Dhaka for business and industrial location. Thus it is no surprise that garments, textiles and pharmaceutical industries have been growing in the periphery of Greater Dhaka. This location preference, among other reasons, has led to sky-rocketing of urban land price in not only core Dhaka but also in peri-urban areas. This, in turn, is constraining domestic and FDI in and around Dhaka City.

Large proportion of Dhaka's urban population is underemployed, if not unemployed. Without a large inflow of investment, Dhaka can neither employ its huge labour force productively, nor can

build the essential infrastructure.

Other than the overall political environment, the factors that are constraining investment are power & water supply, mass transit, and modernization of land, river, sea and air ports. Unless a radical change occurs in near future regarding tackling these critical challenges the investment, and therefore, employment will eventually suffer.

e. Land Price

As a low-income country such as Bangladesh, urban land price in its capital is absurdly high. Comparison of land price data in prime locations of the city and different outer urban areas is presented in Table-5.6.

Table-7.3: Land Price Increase in Dhaka City and Fringe Area (Bangladeshi Taka/meter²)

Area	1975	1990	% increase/ year 1975-1990	2000	% increase/ year 1990-2000	2010	% increase/ year 2000-2010
	Price Tk./m ²	Price Tk./m ²		Price Tk./m ²		Price Tk./m ²	
Motijheel	750	17,910	152.0	52,305	19.2	448,333	75.7
Badda	60	29,85	325.0	8,967	20.0	74722	73.3
Baridhara	373	8,955	153.0	37,361	31.7	298,888	70.0
Demra	60	2,985	325.0	8,967	20.0	37,361	31.6
Savar*				1,120		11,955	96.7
Gazipur*				1,494		10,461	60.0
Keranigonj*				1,120		11,955	96.7

Source: Other than data of 2010, which are from Alam (2011), the table data are from Seraj (2007).

* Denotes peripheral area of Dhaka, Note: 1 US\$=69 Taka.

Data show that, in the time span of 34 years, the residential areas of Motijheel, Baridhara etc. registered highest percentage increase compared to the fringe areas of Savar, Demra, Gazipur and Keraniganj. Currently, Dhaka's land price is increasing at a rate which is much higher than the contemporary developed and developing cities in the world. During 2004-2009 land prices increases per year in the South Asian cities of Kathmandu, Karachi, Kolkata were respectively 50, 70 and 50%, whereas that of Dhaka was 74% per year (2000 to 2010).

Urban land ownership in Dhaka is also skewed. About 57% of Dhaka's population owns no land while 4% of the population owns as much as 28% of land (MacAuslan, 1999, p. 38). The middle and lower middle classes of Dhaka are forced out of the land market, whereas about 50 percent of the populations are living in slums and squatter areas in Dhaka.

Such phenomenal growth in land price has led to land speculation, particularly among land developers and individual plot buyers. At present prohibitive land prices in Dhaka city area pushed the land price up in peri-urban areas also. Most of the peripheral lands have been rapidly purchased by private developers for land and housing development projects, especially speculating on future price increases.

7.3.2 Future Scenario and Potential

a. Projection of Employment Growth

The projected population growth and corresponding job requirement shows that job creation will have to increase from 6.54 million of 2010 to 12.87 million in 2035 at the rate of average 2.0 persons per household, which will give the population-employment ratio of about 50% in RDP area, (Please see **Table-7.4**). This is a very low-key estimate in that these are based on the assumption as if the current number of jobs is adequate for the present level of population.

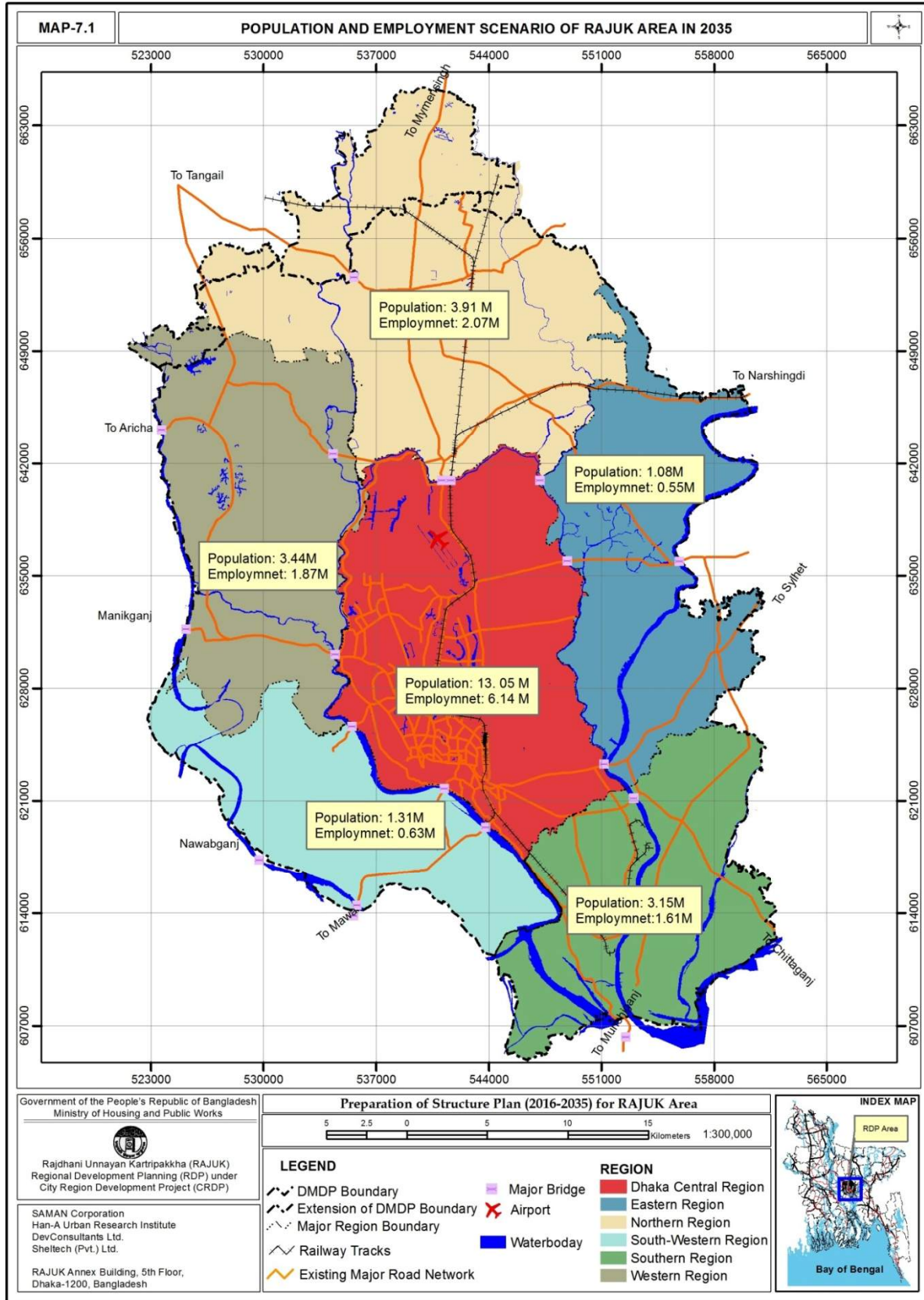
Table- 7.4 Employment Projection

SN	Year	Population (in Millions)	Household (in Millions)	Total Number of Jobs			Population Employment Ratio (In Percentage)
				Avg. of 1.0 per HH	Avg. of 1.5 per HH	Avg. of 2.0 per HH	
1	2010	14.73	3.27	3.27	4.91	6.54	44.42
2	2015	17.32	3.89	3.89	5.84	7.78	44.95
3	2020	19.82	4.53	4.53	6.80	9.06	45.71
4	2025	22.21	5.21	5.21	7.82	10.42	46.93
5	2030	24.22	5.84	5.84	8.76	11.68	48.24
6	2035	25.94	6.43	6.43	9.65	12.87	49.60

Source: Compiled by RDP Consultants, RAJUK, 2014

Note: According to Labour Force Survey (LFS) 2010, the number of employment in RDP areas is about 6.1 Millions (BBS, 2011, p123).

To be sure, in twenty years (base of 2015) not only 5.08 million new jobs will have to be created but these jobs will have to be productive enough to yield an income that would allow an employed labour to pay for all basic urban needs. The challenge is thus not only to create these additional jobs but also to transform 10.55 million informal jobs of the total 12.87 million of 2035 (estimated with the assumption that 82% jobs will still be informal as it is today) to more decent jobs.



b. Dhaka's Economic Potential

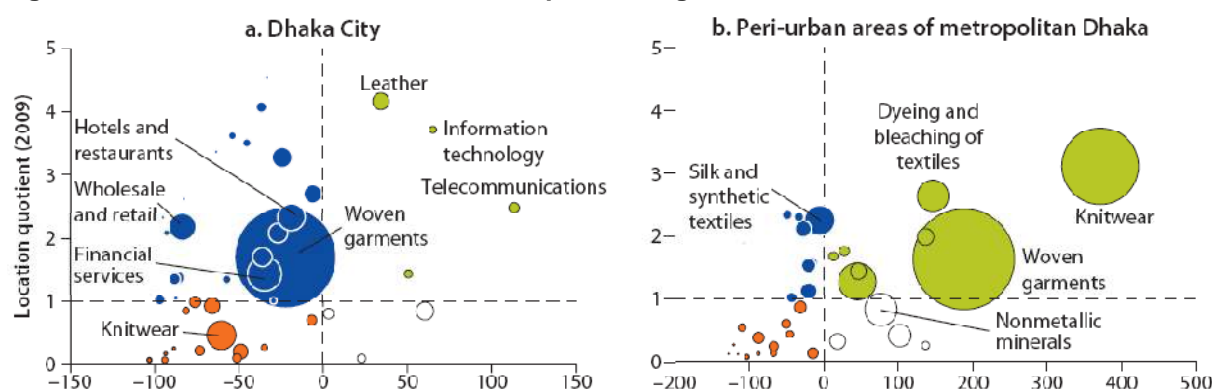
Despite Dhaka's demographic, spatial and economic primacy, it is far behind from its economic potential. Dhaka's employment and economic densities are not at par with its population density. It is not benefitting from scale and agglomeration economies¹. So there is still large room for taking advantage of the agglomeration economy.

Dhaka's GDP currently stands at US \$ 78 million. Since Bangladesh is still a low-income country, Dhaka's contribution to national economy is likely to increase until the county's development reaches certain threshold level of income for polarization reversal to start by virtue of market forces, i.e., without policy planning support. The relevance of this point here is that similar to the leading role of Bangkok in pulling up Thailand's economy, Dhaka is destined to make even a greater contribution in transforming Bangladesh from a rural-agricultural economy to an urban-industrial economy.

c. Thrust Sectors of Dhaka's Economy

In analyzing the economic base of the city, the World Bank study (Muzzini and Aparicio, 2013) shows leather, information technology, telecommunications and woven garments as the most important sectors to the Dhaka economy – sectors with both high location quotients (LQs) and above average employment growth (**Figure-7.1**).

Figure-7.1: Economic Base of Dhaka Metropolitan Region, 2001-2009



Source: Muzzini and Aparicio (2013, p.55)., Source: Based on data from Bangladesh Bureau of Statistics 2001a, 2009.

Note: Analysis is based on a 2001 classification of secondary cities and nonmetropolitan municipalities to ensure comparability over the 2001–09 periods. Dhaka City refers to the Dhaka City Corporation.

The policy implication of this finding is that local economic development strategies need to focus on these sectors to create and maintain adequate economic dynamism. The hotel and restaurants, wholesale & retail and financial services – in the upper-left-hand quadrant – are the sectors with LQs above 1 and declining employment growth. These sectors provide opportunities to strengthen important areas of the local economy. The lower-left-hand quadrant shows knitwear with low LQs and below-average employment growth. They represent the least promising sectors for local economies (**Figure-7.1**).

¹ The above cited World Bank publication also contains an international comparison of population, employment and economic density data of cities that further confirms Dhaka's falling behind in terms of employment and economic densities. World Bank attributes this unfavorable outcome to lack of infrastructure Muzzini and Aparicio (2013, p. 19).

- **Woven Garment**

Woven garments contribute to 49 percent of the formal jobs. However, employment growth in the sector is declining. And as garment production “peri-urbanizes”, there is limited evidence of replacement industries emerging to ensure continued urban vitality in Dhaka City (Muzzini and Aparicio (2013 p.54). Another notable finding is that the “peri-urban areas” of metropolitan Dhaka are emerging as competitive garment production centers”. In 2009, about half of formal garment jobs in the Dhaka metropolitan areas were located in peri-urban areas, up from 18 percent in 2001.

- **Leather**

Footwear & leather, being a high value added sector, has been declared as a highest priority sector. The leather industry is ranked fourth in terms of earning foreign exchange. Statistics at the national level prepared by Export Promotion Bureau for the Financial Year 2011-12 shows that the leather sector grew by 17.5 percent and earned \$765 million in revenue of which 57% was attributed from leather products. The sector generates direct and indirect employment for about 850,000 people, including a significant number of women, particularly in the leather products industries.

Most of the enterprises of the leather industry are located in and around Dhaka. According to a 2013 study supported by EU, a major reason for the large number of SMEs of the sector not functioning at a significant level is the absence of any clustering strategy for joint production and retailing. The above two factors coupled together presents the potential for clustered development of enterprises in the leather sector in the Dhaka Metropolitan. As a high value addition sector, it has huge opportunities in generating highly productive employment and also encouraging entrepreneurship and investment.

- **Information & Communications Technology (ICT)**

Dhaka is national hub of information technology. The shift-share analysis, based on data from the Bangladesh Bureau of Statistics (2001, 2009), indicates that industrial growth, rather than local competitiveness, is the main driver of employment growth in the emerging telecommunications and information technology sectors in Dhaka City (Muzzini, E and Aparicio, G. 2013, p. 103).

Annual formal employment in information and communications technology (ICT) is found to have grown almost at 11 percent over 2001–09, the highest rate of any sector. Foreign direct investment (FDI) has played a major role in this sector’s growth, but still accounts for only 6% (2009) of the service-led employment in Dhaka City.

Bangladesh has been exporting Information technology (IT) services and software to USA, Canada and Japan. Renowned Bangladeshi software users are NOKIA, WB, Japan airlines, HP, US postal and agricultural department. Until now more than 100 IT firms are exporting their software and services to 30 countries around the globe (BES 2013, p. 278).

The country has witnessed a rapid boom in the telecommunication sector. This sector has created huge employment opportunity particularly in Dhaka. In 2004 subscriber was 4 million, in 2013 the total subscriber stood to about 100 million. Till now this sector has generated about 1 million employments in the country (Bangladesh Economic Survey 2013, p. 278).

7.4 Critical Issues

a. Decentralization without Compromising Agglomeration Benefits

To reduce the negative impacts of Dhaka's overwhelming demographic as well as spatial spread there is need for economic de-concentration as well as administrative decentralization. Follow-up actions emanating from this understanding in the form of relocation-decision of economic activities away from Dhaka may lead to foregoing benefits associated with agglomerations both in terms of its two components: localization economies and urbanization economies.

From economic perspective, the critical challenge for the structure plan, thus, is to ensure de-concentration in a way that promotes clustered and compact growth for gaining from scale and agglomeration economies for avoiding undesirable expansion of the city horizontally.

b. Low Employment and Economic Densities

As mentioned already, Dhaka's employment and economic densities are far behind than what is warranted by its population densities. Thus, no wonder that population and their living in high density is widely viewed as a reason for all ills for today's Dhaka. This study suggests undersupply of infrastructure to be the major reason behind phenomenon. Therefore, channeling the investment to create employment and transforming those into highly productive ones is the challenge towards transforming Dhaka's urban space.

c. Coping with Low-Productive Informal Employment

The low-productivity, hence low income from informal jobs do not allow more than two-third residents of Dhaka to pay for acceptable shelter and other urban services. This in turn serves as a barrier for the city authorities to increase supply of urban and environmental infrastructures and basic urban services. Increasing productivity of informal employment is thus a pre-requisite for improving livability of Dhaka city.

d. Guiding the Growth of Industrial Units

Manufacturing industry presents a great opportunity as well as some significant threats to the future of the metro region. Opportunity comes in the form of raising the employment and economic densities by creating more productive jobs. Threats are created in the way of wholesale land conversion from rural/natural use and also through generation of harmful and toxic waste materials. Therefore, guiding the development of industries within the region is crucial to ensure its growth in the right direction.

e. Undersupply of Infrastructure Despite High Land Price

A paradoxical situation is prevailing in Dhaka characterized by huge gap between requirements and supply of urban and environmental infrastructure amid very high land price in the city. This is paradoxical in that the high land price can and should have been basis of recouping the cost of infrastructure. The government seems to have failed to take this opportunity to increase infrastructure supply with the high revenue generated from high land price. Noneconomic reasons, e.g., policy failures to tax incremental land values and undertake infrastructure projects in time are considered causes behind inadequate supply of infrastructure in Dhaka city.

7.5 Future Plan and Direction

7.5.1 Goal

MAKING DHAKA ECONOMICALLY MORE FUNCTIONAL AND PRODUCTIVE

As the hub of nation's economic activities Dhaka's economic role needs to be further lifted up. This calls for taking up measures to make Dhaka economically more functional and productive. Also to make it better livable so that people can concentrate more on productive activities, because Dhaka is destined to lift up the entire nation economically and socially.

7.5.2 Objective and Policy

OBJECTIVE ECO1: TO FACILITATE INCREASE OF ECONOMIC & EMPLOYMENT DENSITIES IN EXISTING URBAN CENTRES

Population density, which is the primary element of agglomeration, can be easily perceived throughout the Metro region. Apart from the core city, many centres can be detected in the peri-urban areas as well where densities have already become very high, like some parts in the Southern region of Narayanganj, or are growing extremely rapidly like in Savar and Gazipur. These points also represent agglomeration of economic activities. Now these high densities need to be translated into higher economic value. Only then the benefits of agglomeration can be fully realized. This will play an instrumental role in elevating the productivity levels of major urban spaces.

Policy ECO1.1: Smoothen Supply of Physical and Social Infrastructure in Priority Locations

Employment and economic density of Dhaka is not what it is warranted by its population density, this is mainly because Dhaka severely lacks basic infrastructure and services to support the growing economic activity. Availability of public utilities, public goods and public transport is a pre-requisite for realizing all the potentials associated with huge labour pool living in high density areas.

- **Strategic Action:**
 - Clear demarcation of priority infrastructure and their locations for reinforcing the policy.
- **Implementation Tools:**
 - Stakeholder participation for setting priorities in undertaking infrastructure projects
 - Stakeholders' meetings at preplanned regular interval for reviewing current projects and their implementation, and about new infrastructure projects to be undertaken on an urgent basis
- **Implementing Agency:** RAJUK, Local Govt. Units (LGU), LGED, CBOs

Policy ECO1.2: Develop Commercial Hubs Within Regional Centres of the Metropolitan Area

To manage mobility, meet service needs of the people of different regions there is need to create new commercial clusters in different regions within RAJUK area. These commercial clusters will not only meet the regional shopping demand but will also serve as hubs of corporate office facilities.

Execution of this policy will reduce travel distance of shoppers, create new service sector hubs within RAJUK area to deal with business services needs to serve the exporters and industries.

- **Strategic Action:**
 - Select strategic locations for establishment of commercial hub
- **Implementation Tools:**
 - Infrastructure Led Development Initiative (ILDI) - provide all services and facilities in the selected area- power, water, waste management, drainage etc.
 - Bonus FAR for commercial development
 - Receiving site for Transfer of Development Rights (TDR) schemes
 - Connect the area with public transit
- **Implementing Agency:** RAJUK, LGUs, Utility authorities, DTCA, Trade Associations

Policy ECO1.3: Reinforce Scale and Agglomeration Economies

Avoid any economically unsound relocation decision so that benefits from scale and agglomeration economies can be maintained. Create disincentive so that economic agents relocate their residential and/or economic units if there are clear evidence of scale and agglomeration diseconomies in the present sites.

- **Strategic Action:**
 - Relocation decision taken based on study of gains and losses to residential and business units from current location.
- **Implementation Tools:**
 - Conduct empirical study would to make sound economic decisions on relocation by knowing if scale economies and diseconomies are still prevailing in a location or they have exhausted.
 - Review study findings to help stakeholders make any relocation decision and to decide by the government on giving incentives and generating disincentives.
- **Implementing Agency: RAJUK, Ministry of Industry, NBR**

OBJECTIVE ECO2: TO ELEVATE INFORMAL ECONOMIC ACTIVITIES INTO HIGHER PRODUCTIVITY LEVELS

Higher productivity and value addition in the informal sector means higher income. This can ensure that the people involved in these activities are in better position to pay for their essential needs like housing, utilities etc. This has further implications in the public infrastructure and services also. Because the public authorities will be induced to provide these infrastructure and services as people will be better able to pay for them.

Policy ECO2.1: Provide for the Informal Sector's Spatial Accommodation Close to their Market

Informal sector of Dhaka is the source of over 80% of the city's total employment. This sector should be facilitated to grow and get improved and gradually merged with formal economy within higher production. One key feature of this kind of economic activity is that they are local in nature i.e. they tend to rely on consumers living/passing next to their areas of operation. Success of their business largely depends on how easily they can access their market. Therefore, they need to be provided in carefully planned strategic locations keeping their modus operandi in mind.

- **Strategic Action:**
 - Selection of site for providing informal business activities
 - Formation of an appropriate tenure arrangement for the business operators
 - Establishment of a small scale replicable demonstration project where the informal business owners are accommodated in a location suitable to their nature of operation without hindering other functions of the space like traffic movement etc.
- **Implementation Tools:**
 - Space allocation to relocate informal enterprises with appropriate level of charges
 - Undertaking pilot projects for space allocation to street vendors at busy locations provided with sanitation services nearby with charge
 - Facilitating informal enterprises by providing collateral free soft credit to upgrade business
 - Skill development training to promote higher production and quality products
- **Implementing Agency: RAJUK, LGUs, SMEF, NGOs, Public & private financing agencies**

OBJECTIVE ECO3: TO ENSURE INDUSTRIAL DEVELOPMENT IS SPATIALLY INTEGRATED AND WELL MANAGED

Manufacturing sector has the potential to create high value added jobs in the Metropolitan region. The key here is ensuring that the industrial units that are set up are done so in a preplanned and organized manner. It will have several benefits. Service delivery i.e. provision of necessary infrastructure and services for the industries can be planned and executed in an efficient manner. Moreover, locating certain industries at specific places based on their nature of operation, material use, market base etc. will make them more effective. All these factors combined can contribute to raise this sector's productivity & make it more functional. Pre-planning industry's location will also have environmental benefits as hazardous units will be easier to monitor & control.

Policy ECO3.1: Promote Compact and Clustered Industrial Growth

Clustered and compact urban-industrial growth, through well-connected transport (i) between the central city and the growth centers and (ii) the growth centers and each of its surrounding areas, will ensure efficient utilization of resources, particularly scarce urban land and promote backward and forward linkages; and reduction of commuting distance, infrastructure cost and improve the local environment.

Utmost importance should be given in promoting industrial growth within RAJUK area. To encourage industrial growth certain locations should be marked in outer urban area and growth management and provide with such incentives as tax holiday, tax exemption, infrastructure and services. Clustered growth will reduce the cost of infrastructure and services and provide greater economies of scale to the enterprises.

- **Strategic Action:**
 - Accommodate proposed industrial growth locations in NBR incentive policy.
- **Implementation Tools:**
 - Mark strategic industrial zones in the Structure Plan map.
 - Propose the zone as mixed use/industrial area and provide infrastructure and services in the zones in the upcoming DAP.
 - Include the zones in NBR list as incentive zone.
 - RAJUK /LGED should take up integrated transport network project for the proposed industrial growth locations.
 - Promote infrastructure and services development in the zones.
- **Implementing Agency:** RAJUK, NBR, Ministry of Industry, Chamber of Industries

Policy ECO3.2: Locate, Declare and Promote Selected Areas as Exclusive Industrial Zones

Some locations within RAJUK area has spontaneously developed as industrial clusters, like Dhamsona, Konabari, Hemayetpur, Karnapara, Ashulia and Yearpur. They need special treatment in terms of infrastructure and services to Promote Industrialization.

- **Strategic Action:**
 - Recognition of the as industrial clusters and priority facilitation by relevant government departments
 - Dhamsona, Konabari and Tarabo area will be developed as specialized center where industrial agglomeration in planned way will be the major functions within those areas
- **Implementation Tools:**
 - Connect industrial areas by efficient public transport;
 - Maintain road and drainage facilities on regular basis;
 - Provide service connection (gas, power) new industries on priority basis;

- Give priority in industrial plan approval ;
- Provide incentive to industries in the form of tax holiday, duty free import of machineries, credit facilities ;
- **Implementing Agency:** RAJUK, DWASA, LGED, PDB/REB, Bangladesh Bank, Ministry of Finance, and Ministry of Planning

Policy ECO 3.3: Plan and Facilitate Provision of Essential Infrastructure and Services for the Estimated Workforce of the Priority Industrial Locations within Affordable Commuting Distance

If past instances of compact industrial agglomerations are studied, like in Dhamsona and Ashulia, it is easily noticeable that accommodation and travel to workplaces of the workforce were overlooked almost completely or were not very well planned and executed. The obvious consequence was that the surrounding areas, almost always rural in nature, were turned very quickly into unlivable high density localities severely lacking in necessary infrastructure and services. The condition was worsened by the absence of proper urban local government bodies to take care of urban services, as these areas were outside the jurisdiction of city corporations or municipalities.

Considering beforehand the kind and volume of workforce to be employed by a planned industrial agglomeration can have several benefits: planned development of surrounding communities, prevent degradation of livability, protect natural environment from deterioration, reducing long commuting need of workers etc. The commuting issue is deemed significant here because the labours tend not to spend large portion of their disposable income on transportation and so live near their workplace. The first priority would therefore be walking. If the nature of industries discourages that, like in the case of noxious industry, affordable public transport has to be in place.

- **Strategic Action:**
 - Integrate workforce estimation and planning part of the industrial plan and development.
 - Incorporate impact assessment of the accommodation of its estimated workforce part of the plan approval process including their environmental (EIA), social (SIA) and transport (TIA) impacts.
 - Chalking out the necessary partnership mechanism and promotion tools for such initiative
 - Implementation Tools:
 - Partnership among implementing agencies, local authorities, community leaders.
 - Collaboration with transport operators for easy and available commuting facilities.
 - MOU between industry owners, implementing agencies and utility authorities for provision of necessary services.
- **Implementing Agency: RAJUK, Concerned LGU, Utility authorities, Industry owners.**

Box-7.2

CRITERIA FOR INDUSTRIAL PARK LOCATIONS

- Link to freight corridors and major transport nodes
- Generally, land area (50-170 hectares) to allow expansion industrial park to accommodate 10,000—40,000 employees.
- Proximity to workforce (within 30 minutes commute).
- Industrial parks should have easy access to adjoining social infrastructure e.g. hospitals, universities, educational facilities, research institutes or clusters of knowledge-based activity.

Policy ECO3.4: Relocate and/or Cluster Polluting Industries at Suitable Locations

Polluting industries are threat to public health, environment and ecology. They are needed to be relocated and the pollutants will have to be treated and then discharged. The existing polluting industries therefore need to be relocated at suitable sites which will also be the location of new red category industries. Relocation is needed to safeguard, ground water, and ensure public health safety particularly the poor people living around the factories.

- **Strategic Action:**
 - Select strategic locations for establishment of noxious industries.
 - Implementation Tools:
 - Provide all services and facilities in the selected area- power, water, waste management, drainage, etc.
 - Provide common ETP to treat pollutants at low cost before discharging into open water courses.
 - Connect the industrial estate with public transport facilities.
 - Arrange easy and reasonable interest credit facilities relocation and new industries.
 - Provide incentives for relocation and export.
- **Implementing Agency:** RAJUK, DWASA, Titas Gas, PDB/REB, LGED, Ministry of Industries, DoE.

OBJECTIVE ECO4: TO HELP FLOURISH APPROPRIATE NATIONAL THRUST SECTORS IN PROPER LOCATIONS OF THE METROPOLITAN DHAKA

Bangladesh has some designated thrust industrial sectors that lead the economy forward. They are also major foreign exchange earners and major employment providers. Most of these thrust sector industries are located in and around Dhaka city. They should be promoted to increase employment and GDP of the city and consequentially of the country as a whole.

Policy ECO4.1: Facilitate Development of ICT Sector in the Core Area

ICT sector has made eye catching progress in the export scenario in recent years. If this sector can be promoted with location, infrastructure and services it can become one of the most rewarding sectors of the national economy. As seen from the experiences of other countries, the bustling metro cores present the perfect mix of various pools of skilled professionals and the space for cross fertilization of ideas that help flourish sectors like ICT which are basically knowledge based. Unlike manufacturing, these industries don't need movement of bulk raw materials or produce large wastes materials that need to be treated in a separate facility. Therefore, they don't need to be away from high density localities to avoid nuisance. Rather they are reinforced by the presence and interaction of people specifically professionals whose knowledge and skills are the only raw material they require.

- **Strategic Action:**
 - Joint body of government and private trade associations for demarcating priority locations for ICT hubs
- **Implementation Tools:**
 - Mark locations within or close to the core city for ICT establishments and provide necessary services like, uninterrupted power supply, high speed internet connection, etc.
 - Select Purbachal Industrial site exclusively for ICT based activities.
 - Expedite sub-marine cable network connection through SMW-5 Consortium whose landing station will be at Kuakata as an alternative internet link.
 - Reduce the cost of internet operation to enable greater access to ICT information super-highway.
 - Expedite operation in Kaliakoir High-Tech Park.

- **Implementing Agency:** BTRC,BTCL, mobile telecom companies, Ministry of Information and Communication Technology, Ministry of Finance, Ministry of Planning

PolicyECO4.2: Promote Woven Garment and Knitwear in Peri-urban areas of the Metropolitan

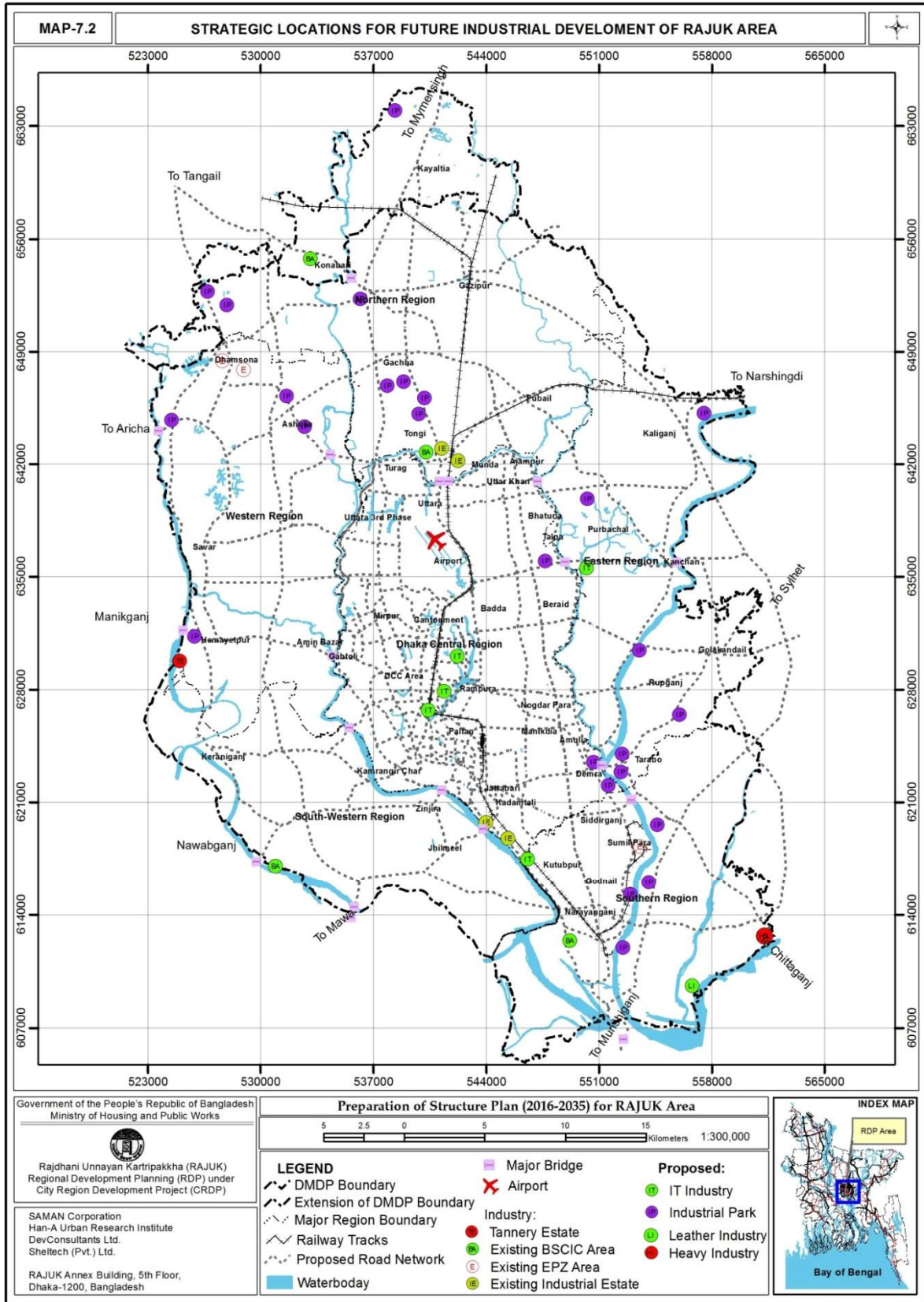
About 80% of the nation's garment factories are in and around Dhaka City and most of them are in city core. This is creating multifarious problems, the most important being traffic congestion. They need to be relocated in peripheral areas. In fact, there is already a trend reinforcing this policy as garment units move out of the main city, sometimes conforming to the compliance guidelines of their buyers. And as mentioned earlier peri-urban areas are also emerging as competitive manufacturing spaces.

- **Strategic Action:**
 - Further strengthen existing policies about woven garment and knitwear sector with long term objectives.
 - Implementation Tools:
 - Provide infrastructure and services to Garment and Knitwear Factories on priority basis
 - Limit growth of garment factories in the Central Urban Area
 - Ensure safety of the workers against fire hazard and building collapse through regular inspection and imposing safety regulations
 - Connect the industrial clusters with public transport facilities
 - Prepare and execute a comprehensive development plan of the area including services provision for workers' accommodation and transportation
- **Implementing Agency:** RAJUK, DWASA, Titas Gas,PDB/REB,LGED, Ministry of LGRD

Policy ECO4.3: Establish Exclusive Economic Zone for Leather Industries in Growth Management Area

Leather is 4th largest foreign exchange earning sector of the country. This is a thrust sector and its products are 90% value added. This sector should be promoted as a part of export diversification. Most tanneries and leather factories are located in and around Dhaka.

- **Strategic Action:**
 - Select strategic locations for establishment of new and relocation of existing leather industries and provide necessary infrastructure and services including ETP.
 - Implementation Tools:
 - Select strategic areas for establishment of leather industries.
 - Establish exclusive economic zone for leather industry;
 - Provide all services and facilities in the selected area- power, water, waste management, drainage, etc.
 - Expedite transfer of Hazaribagh tanneries to Savar Tannery Estate.
 - Provide common ETP to handle pollutants at affordable cost.
 - Connect the industrial clusters with public transport facilities.
 - Arrange easy and reasonable interest credit facilities for investors.
 - Provide export incentives.
- **Implementing Agency:** RAJUK, DWASA, Titas Gas, PDB/REB,LGED, Ministry of Industries



CHAPTER 08 PUBLIC FACILITIES FOR BETTER URBAN LIVING



CHAPTER 08

PUBLIC FACILITIES FOR BETTER LIVING

8.1 Introduction

Infrastructure and public facilities are the physical assets required to have access to needed major physical and social amenities and services. Broad list of infrastructure comprises facilities physical and social in nature. This Chapter considers such infrastructure and public facilities as, drainage and hydrology, water supply, solid waste, sewerage and sanitation, energy, telecommunication, education and health etc. Services like electricity, water, gas etc. and drainage facilities should be brought to adequate scale and service level in the potential urban areas. The Chapter provides analysis of existing scenario of each issue sets the objectives and then draws up policies.

8.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of existing public facilities and the new policies proposed in the Structure Plan.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Adequate number of legal backup in place to support the provision of basic services within the planning boundaries. • Drainage Master Plan, Water Supply Master Plan and Sewerage Master Plan of DWASA • National Water Policy & National Water Management Plan • Organized service giving agencies. • Strong telecommunication connectivity. • Substantial number of education and health facilities. 	<ul style="list-style-type: none"> • Available water channels to drain out drainage water. • Ample sunlight for solar energy production. • Available surface water channels/waterbodies for water extraction. • Good scope of rainwater harvesting by households and institutions in order to increase water supply; • Adoption of school zoning concept may reduce the travel demand; • Incorporation of reduce, reuse, recycle (3R) strategy with the view of waste minimization may relieve the necessity of landfill site; • Good number of water sources for potable water supply; • Presence of vast amount of natural areas; • Increasing public awareness.
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Poor solid waste management. • Highly inadequate sewerage network coverage. • Poor state of coordination among service giving agencies. • Weak enforcement of law and lack of legal framework • Weak institutional arrangement • Fund constraints and lack of infrastructure maintenance 	<ul style="list-style-type: none"> • Flooding due to illegal encroachment and filling of water channels and flood flow areas. • Traffic congestion due to over concentration of public gathering institutions. • Pressure of population in the core city on public facilities; • Indiscriminate dumping of industrial, clinical, domestic waste into rivers, canals, lakes, roads; • Rapid urbanization and unprecedented Rural-urban migration

8.3 Drainage and Hydrology

8.3.1 Scenario Analysis

Dhaka is known as a water logging and drainage congestion city— losing its past glory for numerous natural khals and wetlands of fresh water. Wetlands in Dhaka city are divided into two categories water bodies and lowlands which comprises the surrounding rivers, the lakes, ponds, khals, and low-lying areas. The surface water area of Dhaka Central Region is about 13% of total land area. Drainage has two aspects: flood protection and storm water discharge, which are interrelated. The storm water and flood protection in Dhaka are not local but have regional bearing including areas of other parts of the country.

a. Natural Drainage and Flooding

The water resources of Dhaka Metropolis are threatened by both human activities as well as natural causes. Climate change is affecting Dhaka Metropolis in two ways: through increased frequency of flood flows, drainage congestion and through heat stress. Because of its geographic location, Dhaka Metropolis suffers from river floods annually. The city also suffers from frequent storm water flooding. The illegal encroachment of rivers, water bodies, lands fillings, the indiscriminate dumping of domestic and industrial waste into rivers and canals are accelerating the drainage congestion. As a result, Dhaka Metropolis is facing storm water flooding during heavy rainfall leaving parts of the city inundated for several days and cause severe economic damages and health hazards. The city governments of Dhaka and the institutions empowered with various planning and management responsibilities are weak in taking appropriate innovative approaches and regime to manage and sustain development in this rapidly urbanizing city.

- **River Network**

The local surface water hydrology around Dhaka is complex. The Dhaleswari River, a tributary of the Jamuna River flows by the south-eastern part of the North Central Region of Bangladesh, close to the confluence of the Padma River (Ganges) and Upper Meghna River (**Map-8.1**). The Lakhya River joins Dhaleswari at 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.

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. The Dhaleswari-Buriganga-lakhya-Balu River system is tidal during the dry season when upstream inflows are minimal.

- **Khal and Lake System**

The low-lying areas, canals, lakes and ponds of Dhaka city act as retention basins and perform the drainage function. The storm water is accumulated in the low-lying areas and lakes; flows through the storm channel i.e khals and discharged to the surrounding rivers. The functioning of the drainage system depends on the water level of surrounding rivers. Generally, during monsoon the surrounding river water remains high. Thus, the drainage system is under the influence of backwater effect from surrounding rivers.

The Dhaka Region has more than 50 khals that drain 80% storm water of the city to the surrounding rivers (Khan 2006). The major khal systems are (Chowdhury et al. 1998b):

- Degun-Ibrahimur-Kallyanpur khal system that drains to Turag River;
- Dhanmondi-Paribagh-Gulshan-Banani-Mohakhali-Begunbari khal system that drains to Balu River;
- Segunbagicha-Gerani-Dholai khal system that drains to Balu and Buriganga rivers.

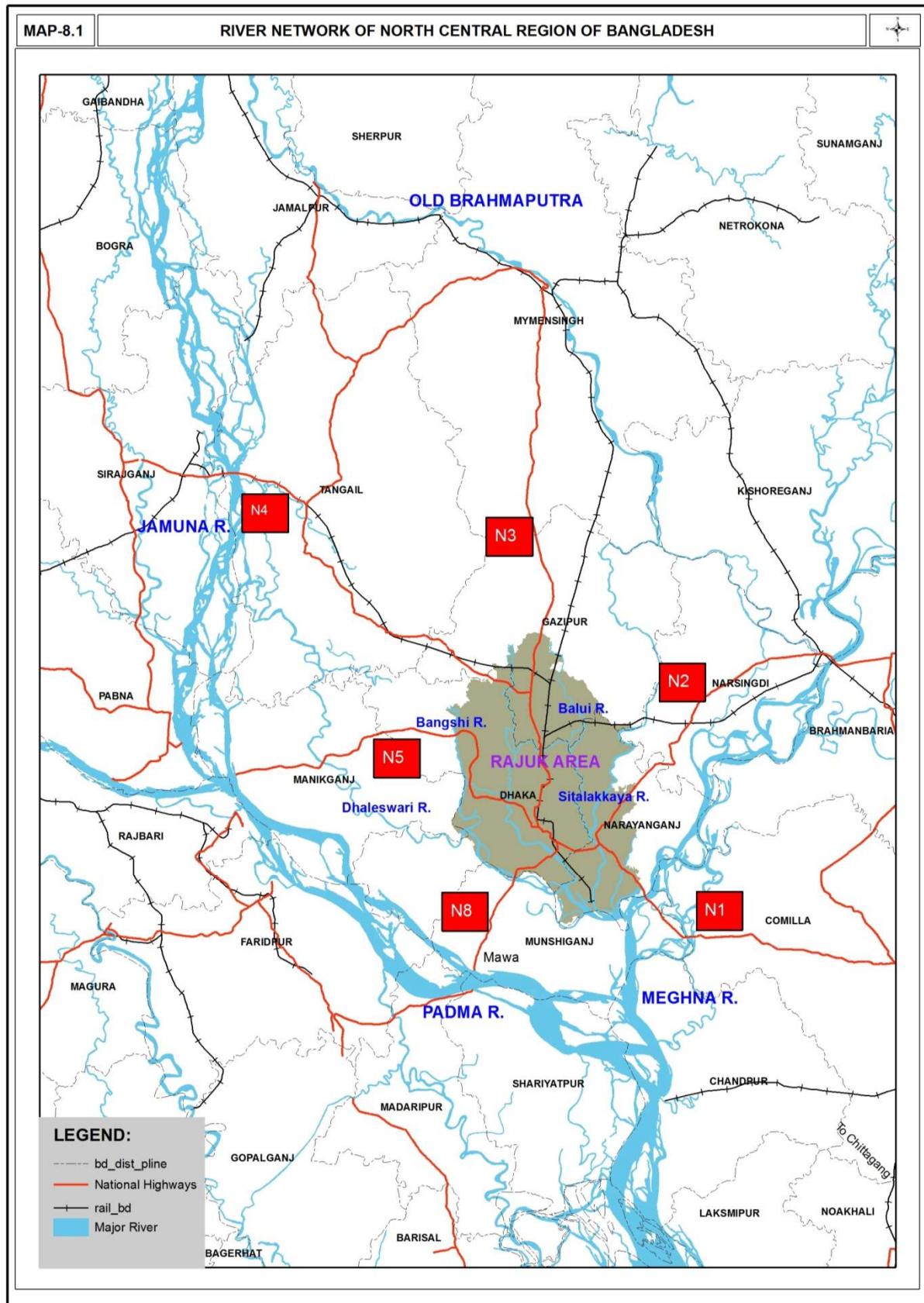
- **Water Logging**

Dhaka has been experiencing a gradual increase in water-logging over the last decade. Moderate to heavy rain causes serious drainage problems in many parts of the city with knee-deep water on the streets. The process of rapid urbanization is not paying required attention for adequate drainage facilities causing water logging and temporary inundation in parts of Dhaka for several days during monsoon. Dhaka is protected from river flooding by an encircling embankment. Most of the time during the monsoon water level in the river remains higher than the terrain inside the city area. This has brought the reality that, during the monsoon from May to October, the city drainage depends very much on the water levels of the peripheral river system. The situation worsens when monsoon runoff generated due to continuous rainfall coincides with high water level in the river systems. There are also other Justifications for which the city experiences temporary flooding even during the period when natural drainage is possible. Among them the most important is insufficient drainage facility that creates frequent inundation when there is high intensity rainfall occurred in Dhaka city. The issues for Dhaka's water logging scenario are-

- Only construction of Embankment around Dhaka city can promote water logging in the inner city.
- Encroachment of surface water bodies (canals, rivers and ponds) can aggravate the risk of water logging.
- Micro-drainage system cannot carry out the load and they are not being upgraded, maintained and managed on a regular basis.
- Poor, partial and overloaded sanitation can pose serious health hazard to the dwellers during water logging particularly in the low-lying areas.

- **Flood Plains**

The rivers and flood plains within the RAJUK area play an important role in both the ecology and the economy of the capital region. Apart from being the source of flood risk to urban development, they are also the provider of water both for agricultural irrigation and for urban uses. As such, the flood plain and the rivers they contain require policies which will both limit the damage inherent in uncontrolled flooding and manage and conserve the rich resources which they bring to the areas rural and urban economies alike. The project area lies on the downstream part of the North Central (Hydrologic) Region (NCR) of Bangladesh. The region is bounded by the Old Brahmaputra on the North and East, the Meghna on East and South, the Ganges on the South and the Jamuna on the West. Rivers like the Turag- Buriganga, Balu, Lakhya, Bangshi- Dhaleswari and Tongi Khal among others would influence water level in the RAJUK area.



It is well known that the state of flooding and environment in the capital city is already in a precarious state. All rivers in the RAJUK area very frequently flow over the danger levels (Table-8.1). As the mouth of the rivers are not clear, the flood flow zones are not maintained properly and part of it encroached, during the monsoon, the water level in rivers remain too high to drain out water from the RAJUK area and as such the roads look like drains. When all the vacant land under the settlement area within RAJUK area will be occupied, the situation would be worse. It is understood that in the coming years, there would be huge settlements and industrial development on the northern part of the project. That would reduce percolation downward to increase the surface run-off. Any development on the north side of the project would affect the drainage capacity of the rivers. As such the flood plain should be properly maintained. It has been found from the RDP survey that, inadequate control over proposed land use of DAP, 30% of flood flow zone encroached.

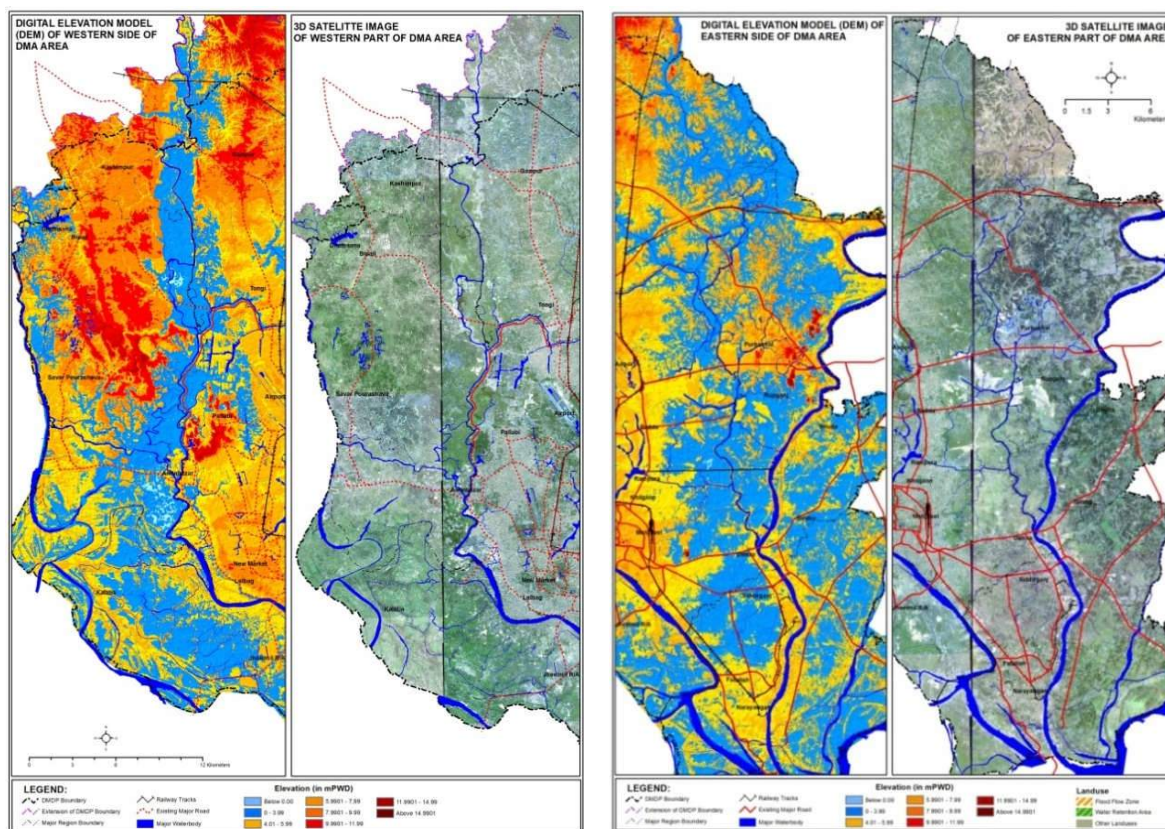
Table-8.1: Water Level in Different Years

Station	River	Danger Level	HWL	Year Corresponding to HWL	Years, Danger Level Exceeded
		(mPWD)			
Demra	Balu	5.75	7.09	1988	1982,83,84,87,88,91,93,95,96,98, 2000,02,03,04,05,07,08 (17/29)
Nayarhat	Bangshi	7.32	9.90	1988	1984,87,88,98 (4/30)
Dhaka	Buriganga	6.00	7.58	1988	1984,87,88,95,98,2004,07 (7/29)
Hariharpara	Buriganga	5.80	9.03	1996	1987,88,95,96,98 (5/25)
Rekabibazar	Dhaleswari	5.18	6.87	1998	1983,84,85,87,88,91,93,1995-2005, 07,08 (20/27)
Lakpur	Lakhya	5.80	7.87	1998	1983-91,93,1995-2003,05,10 (21/23)
Tongi	Tongi Khal	6.08	7.84	1988	1984,87,88,95,98,99,2003,04,07,08 (10/29)
Mirpur	Turag	5.94	8.35	1988	1983,84,87,88,91,93,95,96,98,99, 2000,02,03,04,05,07,08 (17/30)
Narayanganj	Lakhya	5.50	6.95	-	-

Source: BWDB data (1981-2010)

Comparative Flood view between Digital Elevation Model (DEM) and 3D Satellite Images of plains of western and eastern part of DMA has been presented in the **Map-8.2** below. Light blue areas represent flood plains along the Balu and the Dhaleswari Rivers where average land elevation is below 2.00 mPWD. These areas remain submerged all most in every rainy season. These naturally depressed areas should be kept free from all kind of urban development to avoid adverse hydraulic effects during flood.

Map-8.2: Comparative view between Digital Elevation Model (DEM) and 3D Satellite Images of Flood Plains of RAJUK Area



b. Current Flood Protection and Drainage

Dhaka city was affected by severe flooding three times in the recent past, 1988, 1998 and 2004 (**Table-8.2**). 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.

Table- 8.2: Outline of Severe Flood Damage of Dhaka City Area

Year	Description
1988	85% of the city area was submerged with a water depth of 0.3m to 4.5 m from the ground level and inundation continuous for 20 days. 60% of the city habitant was affected.
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.

The highest water level was recorded in 1988 around Dhaka City is shown in **Figure-8.1** and The water level of Buriganga River in Dhaka is shown in **Figure-8.2**.

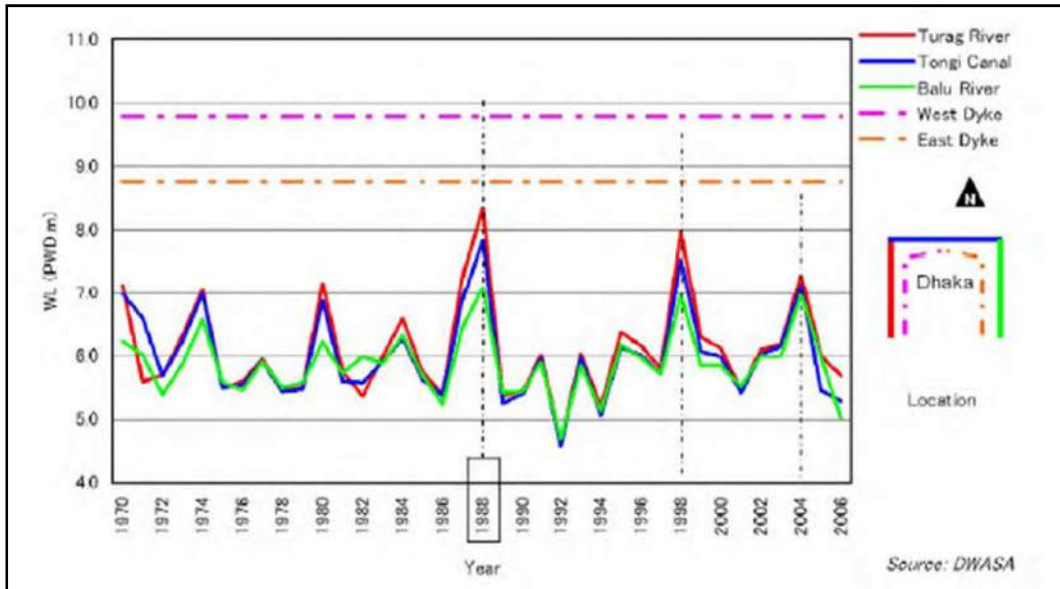
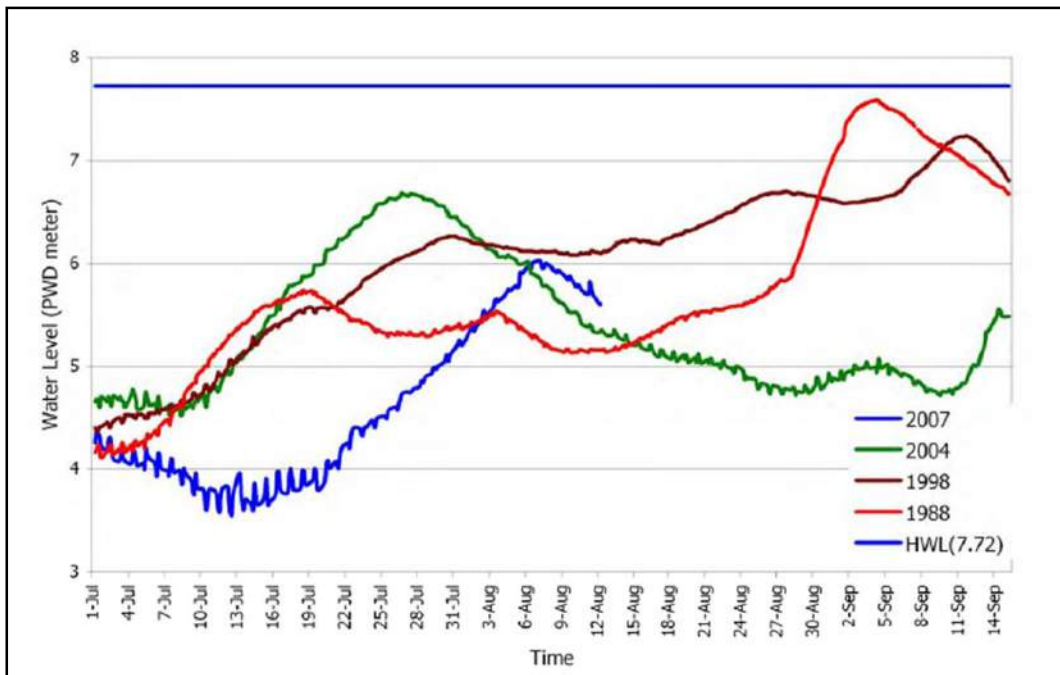


Figure-8.1 Maximum Water Levels (1970-2006) of Major Rivers Around Dhaka City



Source: Dhaka Water and Sewage Authority (DWASA)

Figure-8.2 Water Level of Buriganga River in Dhaka

The flood protection of the Dhaka City (260 km²) was divided into two phases (DIFPP I & II). Phase-I was for the western side of the city having an area of 136 km² namely FAP 8B. Phase-II was for the eastern side of the city having an area of 124 km² namely FAP 8A (**Map-8.3**)

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 km² (**Map-8.3, 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.

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 (**Map-8.3, Dyke-2**).

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 (**Map-8.3, Dyke-3**).

c. Topographic Condition

Distribution of the land elevation below and above 4m PWD of RAJUK Area is presented in **Map-8.4**. Nearly 70% of Western Area ground level is higher than PWD 4 m. There is no severe inundation in the area where the ground level over PWD 4m based on the improvement plan implemented by DWASA. However, due to poor maintenance of the existing drainage facilities by DWASA, local inundation/water logging 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-8.3 (A) and 8.3 (B)**.

- **WEST-EAST**

Ground level of Bangshi River to Mirpur to Rugganj area varies from 0.0825m PWD to 13.84m PWD. the average ground level between Banagram mouza to Mirpur Beribadh is below 2.00m PWD, this part is inundated area, while from Beribadh to Bara Kathaldia mouza it is higher than 4m PWD. On the other hand, from Bara Kathaldia mouza to Sitalakkaya River, ground elevation is lower than 4m PWD.

- **NORTH-SOUTH**

Ground level of Gazipur to Keraniganj varies from from 0.0825m PWD to 13.84m PWD d Tejgaon area is higher than PWD 4 m. Area between Gazipur to Jheelmil Residential area higher than PWD 4 m as shown in Figure 8.3-8 (B) below. So the area is not affected by local inundation frequently.

- **Situation 1 and 2**

Dhaka Metropolitan area is not surrounded by dyke/embankment. Surface 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 of non existence of flood protection measures between city and the river. Dhaka city condition of 1988, 1998, 2004, and 2010 was in Situation 1 and 2, and Situation 2 is still happening in each rainy season at eastern fringe of Dhaka City area.

- **Situation 3 and 4**

Situation 3 shows the City area protected with dyke from flooding by the river. Surface water drains into the river thorough regulator structure along the dyke when the river water level is low. Surface water is drained into the river by pumping drainage when the river water level is high. However, as capacity of the pumping drainage is insufficient to drain, city area is inundated by rainfall not for flooding by the river. After completion of FAP 8B, the western part of Dhaka is in Situation 3 and 4. So, along with embankment cum road, it also requires retention pond, retention canal, and exiting khals, drainage structures, etc. to discharge the surface run-off to river to mitigate the water logging problems of Dhaka City.



Map-8.3: Current Flood Protection of Dhaka Central Area

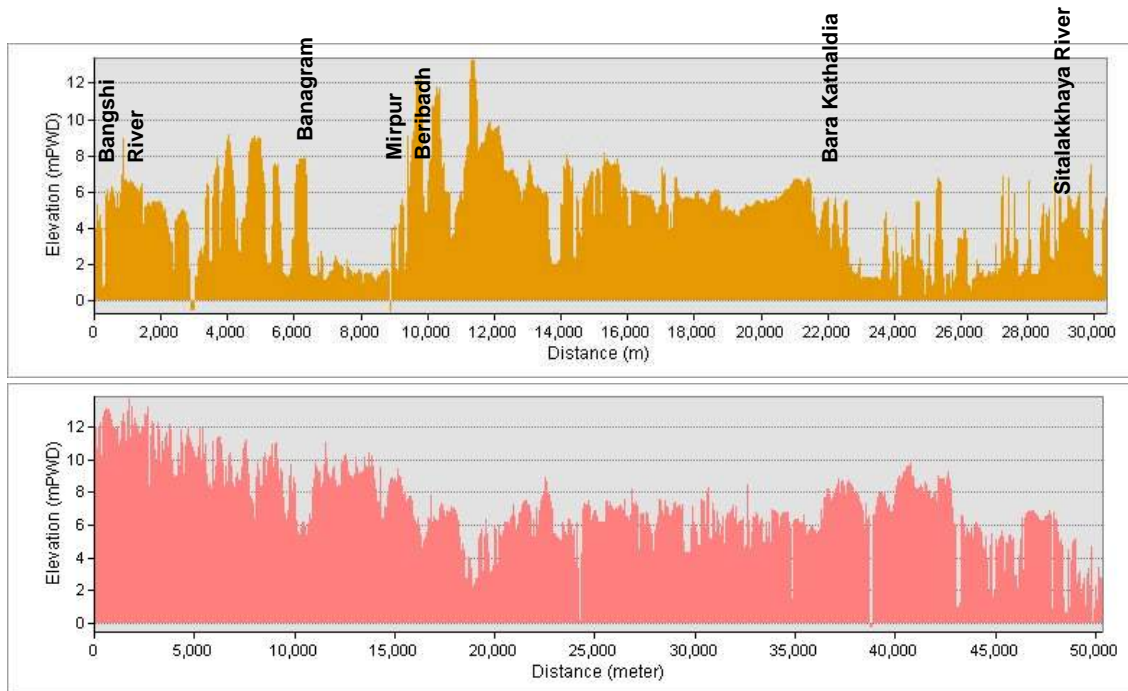


Figure-8.3 (A and B): Cross-Section of Land Level from East to West and North to South in RAJUK Area

Current flood situation of Dhaka City Region may be explained with **Figure-8.4**

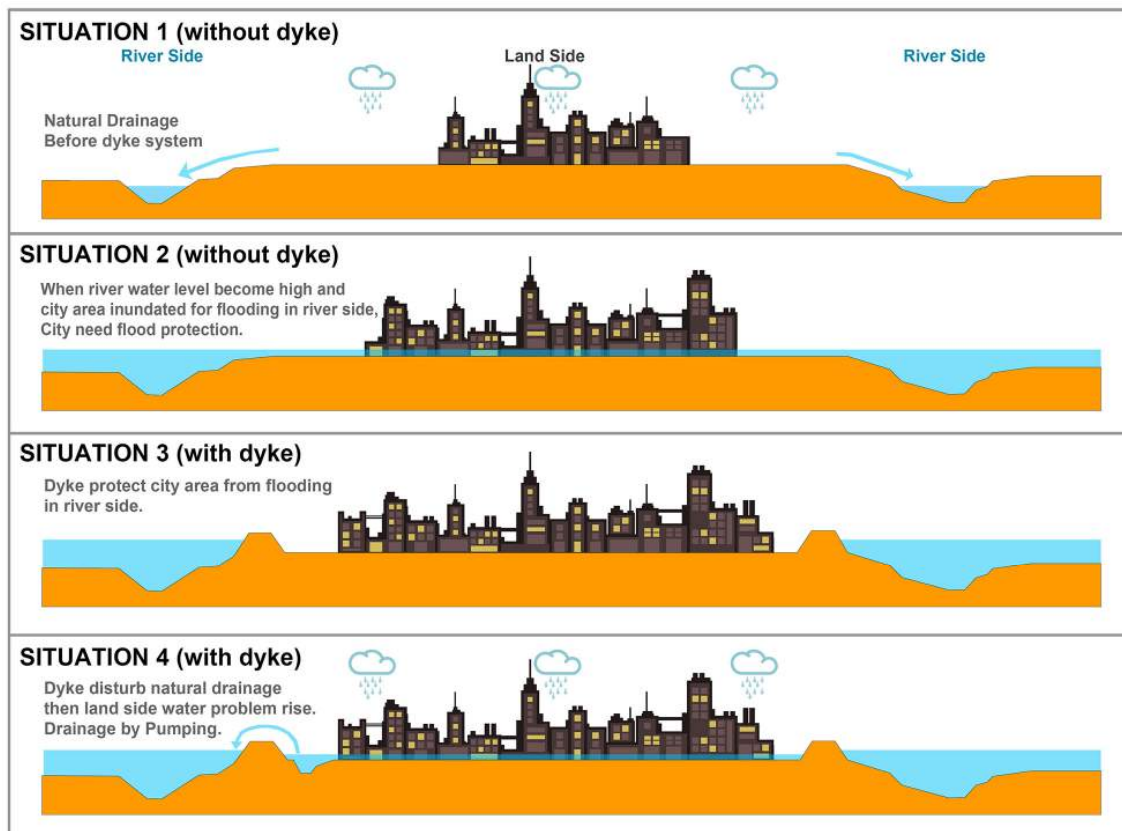


Figure-8.4: Graphical view of Flood situation of Dhaka City Area

Source: DHUTS Report, 2012

For last few decades' development in the flood flow areas within RAJUK jurisdiction is going on despite planning and legal restrictions. But poor monitoring and enforcement of plans and legal powers have so far failed to put curb on most of these activities. Once a restricted low land is filled up and inhabited it is almost impossible to reverse the situation from practical point of view. Apart from reducing flood vulnerability, the flood flow areas, wetlands and water bodies also serve many environmental functions. They absorb heat generated by 'urban heat island', preserve bio-diversity, help recharge groundwater and provide breathing space. Thus, though such activities promote development in those areas but these development potentials are **not positive in the long term**. From the above critical analysis, RDP has proposed a conservation zone which especially includes **flood flow** and **water retention area** that must be preserved for maintaining a sustainable environment of the Dhaka Metropolitan Region (Please see **Map-8.5** and **Map-8.6**).

8.3.2 Future Plan and Direction

a. Goal

FLOOD WATER MANAGEMENT FOR PROTECTION OF LIFE AND PROPERTY

b. Objectives and Policies

First ever policies on drainage and hydrology was provided by Structure Plan in 1995, where policies were set on flood control, flood flow zone and drainage. Structure Plan was followed by Detailed Area Plans (2010) where more detailed proposals were made based on the policy framework of Structure Plan. But Detailed Area Plan was prepared about 13 years after the Structure Plan. During this long time span substantial spatial changes took place in and around the city. The current Structure Plan redefined some of these areas considering land elevation using 3D Satellite Images and where substantial development have taken place, mostly the designated sub flood flow zone of previous structure plan of 1995.

Recently, DWASA is preparing detailed and comprehensive Storm water Drainage Master Plan for an efficient drainage network of greater Dhaka City, which will be treated as basic document for stormwater/manmade drainage network plan for DAP, 2016-2035.

From the above critical discussion, following objectives and policies are targeted for efficient management of flood plains, water retention areas and flood protected structures within Dhaka Metropolitan area:

OBJECTIVES-DH 01: TO ENSURE FLOOD PREVENTION

Flood prevention is necessary to avoid damages to property and life. To avoid the adverse hydraulic effects of flood it should be prevent from happening. Various engineering and non-engineering measures can help devastating effects of flood.

Policy-DH/1.1: Protection of Flood Flow Zones

To minimize adverse hydraulic effects, the risk to human life and economic damages development in flood flow zones will be subject to control.

- **Strategic Action:**

- Strict control on construction or development in the flood flow areas. (**Refer: Map-8.5**)

- **Implementation Tools:**

- It will be ensured that no development takes place within flood plains that will restrict flood flow, or put at risk of human life or infrastructure investment.
- Land development for residential, commercial and industrial, including raising the level of land,

- via land filling, will be strictly prohibited.
- Feasibility study for applicability of various market based tools like Land Readjustment, Transfer of Development Rights (TDRs) and marketable development rights (MDRs) etc. for preservation of flood flow zones within the RAJUK area can be taken;(please see in **Chapter-04**).
- Strict vigilance on violation of ban on development.
- Remove impediments (e.g. illegal land filling and developments) to facilitate regulated flooding in flood-flow zone marked in the Structure Plan.
- Legal action against any violation of the plan.
- Permitted uses in the flood flow areas will be.
 - Promoting different commercial farming programs.
 - Recreation facilities in dry season.
 - Ferry terminals; and
 - Excavation of mineral deposits, including dry season brick works. Provided that they cause no adverse hydraulic effect.
 - Causeways for roads or railways will be permitted, subject to detailed geological survey being undertaken and on condition that they are built with culverts sufficient to allow unimpeded flood flow.
- Establish regional cooperation to improve real-time data gathering and forecasting of floods.
- Encourage community participation in O&M of the flood control infrastructure.
- Develop comprehensive Watershed /Water Resources Management Action Plan that accounts for climate change impact and adaptation measures conforming to future urban development plans.
- **Implementing Agencies:** BWDB, RAJUK, LGED, and DWASA

Policy-DH/1.2: Protection of Khals and Rivers

With the increase in land price the state owned water channels often become victim of grabbing. They must be protected to allow city's storm water drainage to flow into the rivers. Protection of khals will help maintain effective drainage system.

- **Strategic Action:**
 - To protect and preserve a unique and valuable resource for the benefit of the health, safety, and welfare of the citizens for the Dhaka Region;
 - To protect and preserve the river as an essential element in the local, regional and national transportation, sewer and water, and recreational systems; and
 - To protect and preserve the biological and ecological functions of the River.
- **Implementation Tools:**
 - Delineate boundaries of all state owned water channels including khals and rivers based on cadastral maps and mark their flow and over flow zones physically with pillars.
 - Identify and preserve all khas ponds within RAJUK area;
 - Maintain strict vigilance against any kind of unauthorized occupation and filling.
 - Take legal action against the violators.
 - All kind of development for residential, commercial and industrial purposes in the manner of stilt structure will be strictly prohibited.
 - Initiate re-excavation of canals as needed.
 - Identify the encroached water bodies and recover them as early as possible.
 - Keep the rivers functional by regular dredging.
- **Implementing Agencies:** District Commissioners, BWDB, RAJUK, Local Government Agencies and GED, DWASA

Policy-DH/1.3: Protection of Flood Water Retention Areas

Flood water retention areas are key and critically important component of the proposed FAP 8A and 8B flood protection schemes. The proposed retention areas have been designed to reduce the intensity of local flooding within the protected areas and also to reduce pumping requirements at times of maximum surface run-off. The retention ponds are proposed to ensure that city's natural drainage system is not compromised and that the effects of water logging are minimized. (Refer: Map-8.6)

- **Strategic Action:**

- Use legal measures and apply innovative techniques to preserve retention ponds.
- All developments in the eastern fringe area should safeguard the retention pond areas and khals;
- All private housings within eastern fringe area should incorporate flood water management and higher level (**Structure Plan and DAP**) road proposals;

- **Implementation Tools:**

- Freeze all developments and sale of properties in designated water retention pond areas.
- Immediate acquisition of the lands to complete the works and compensating the land owners with proper compensation package.
- In case the land is not acquired arrange for proper compensation of land owners for restricting use and sale of land.
- Make feasibility study for applicability of various market based tools like, Transfer of Development Rights (TDRs) and marketable development rights (MDRs) etc. for preservation of flood water retention pond (**please see in Chapter-04**).
- After development of retention pond make use of the land in the following manner as per land use plan:
 - Promoting different commercial farming programs in dry season until the proposals are implemented.
 - Use them as alternative sources of surface water supply.
 - Carry fish cultivation ; and
 - Recreational uses for example all the proposed water retention areas may be developed like **Hatirjheel Lake** which is now one of the major hub for providing recreational facilities of Dhaka City area; (**Figure-8.5 below**).
- Where uses other than those listed above already exist, should be declared non-compliance and discontinued and the owners compensated by the Government, either in the form of compensation, or equivalent land swap.
- No land filling or permanent structures should be permitted;

- **Implementing Agencies:** BWDB, RAJUK, LGED, and DWASA

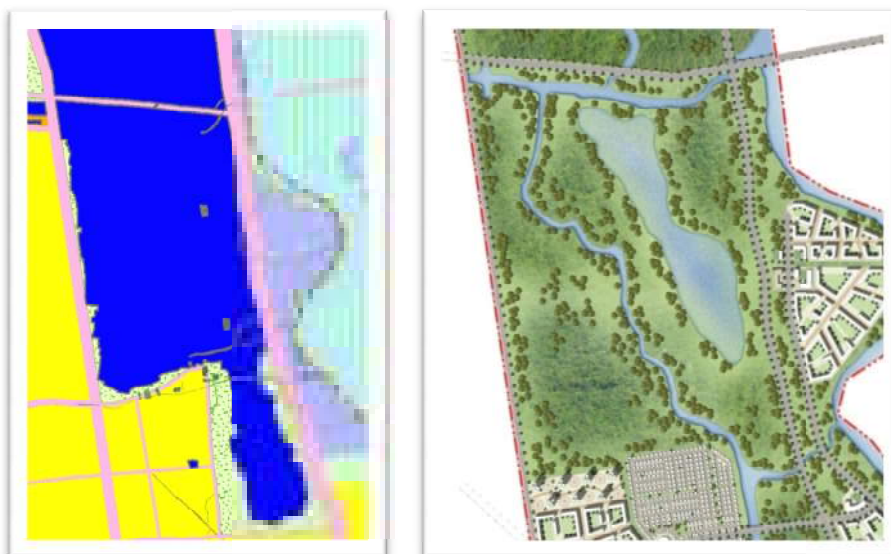


Figure-8.5: Alternative Uses of Designated Water Retention Areas for Recreational Purpose

OBJECTIVES-DH 02: TO PROTECT SETTLEMENT, LIFE AND PROPERTY FROM FLOOD

Vast areas of the eastern fringe of Dhaka are subject to inundation during monsoon, because there is no flood protection embankment on the eastern fringe. Flood protection will allow new development and expedite urbanization in the eastern periphery.

Policy-DH/2.1: Build Flood Protection Embankment to Protect Property and Life from Flood

- **Strategic Action:**

- Ensure flood protection of the Eastern fringe area;

- **Implementation Tools:**

- Construct flood protection embankment along the Balu River;
- Take up project to build flood protection structure.
- Allocate budget for execution of the project.
- utilizing embankments for transport purposes where it would prove economic to compromise with flood protection aims in order to capture transport benefits;
- Develop infrastructure to cope with flooding, i.e. 4 pumps along the Eastern Embankment;

- **Implementing Agencies:** BWDB, LGED, and DWASA.

Policy-DH/2.2: Improve Capacity and Institutional Strength of the Agencies Responsible for Flood Control and Drainage.

For optimal benefit, the capacity of the concerned institutions as well as their individuals should be enhanced.

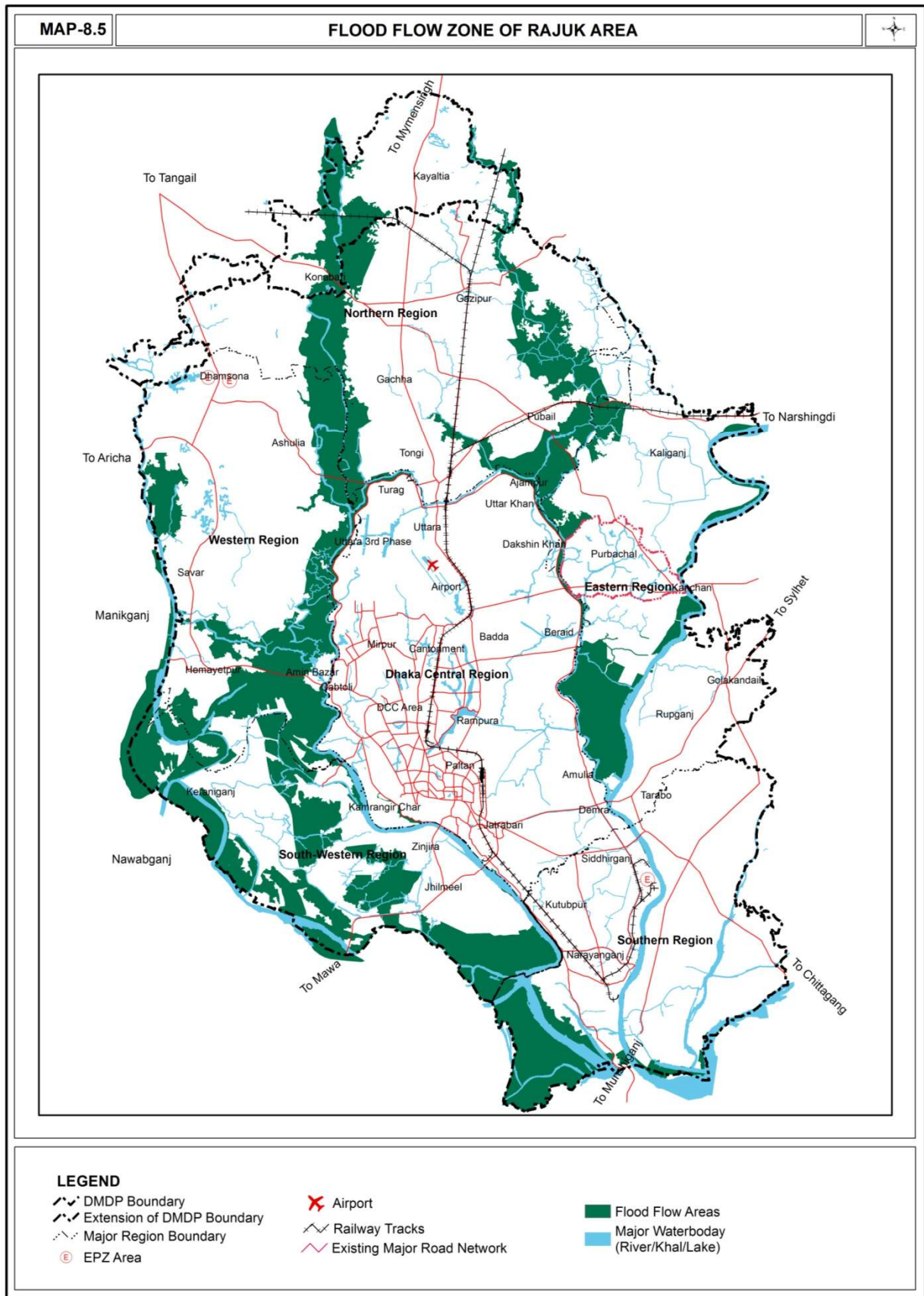
- **Strategic Action:**

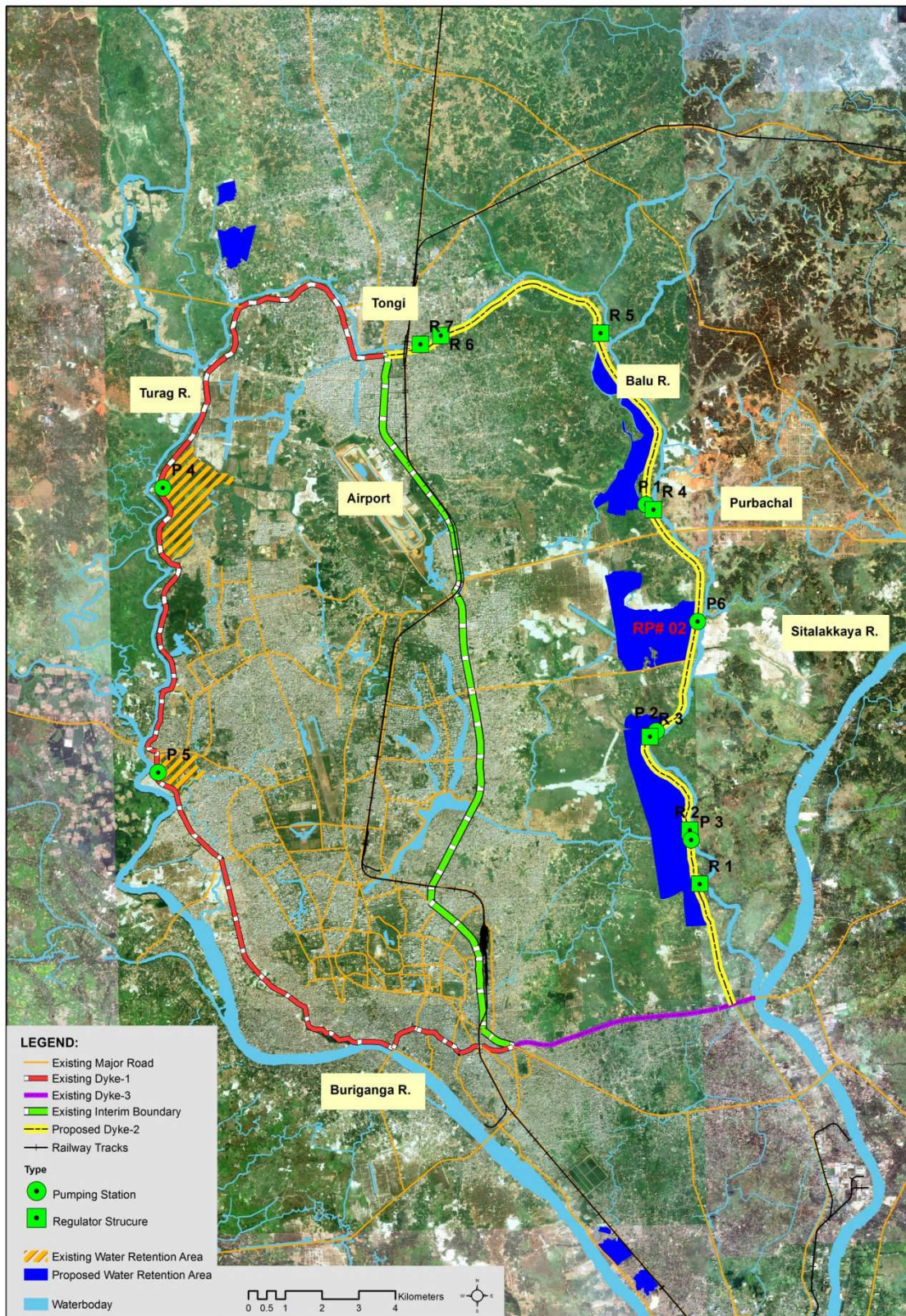
- Provision of adequate skilled and trained manpower.

- **Implementation Tools:**

- Arranged adequate and skilled manpower and logistics for undertaking effective measures to flood control and drainage in BWDB and LGED.
- Initiate awareness building and promote good governance in city management
- For project personal in the concerned institutions, arrange on-field training session on construction, operation and maintenance on regular basis.

- **Implementing Agencies:** BWDB, LGED, DWASA





Map-8.6: Proposed Drainage Facilities of Dhaka City Region

8.4 Water Supply

8.4.1 Scenario Analysis

Currently, groundwater is the main source of water supply in urban Dhaka. According to the resources assessment study (IWM, 2006), the total allowable limit of withdrawal from the upper Dupitila aquifer is 448 sq km influence area of Dhaka well field is 604 million cubic meters per year or 1640 MLD in the base condition of 2006. The study also mentions that total drainable water from the confined and pressurized lower Dupitila aquifer is 139 million cubic meter per year for a rated drawdown of 15m. It may be concluded that the deeper aquifer is no longer dependable as a long term sustainable water source. The Well Field Construction project at Tetulzhora – Bhakurta Area of Savar Upazila (Part-I) is on –going and the other proposed project is the Well field Construction Project Dhalla – Jamitra area of Singair Upazila (Part-II)

a. Ground water

The availability of groundwater for drinking purposes, however, has become a problem for the following reasons:

- lowering of groundwater level;
- excessive dissolved Ammonia;
- excessive amount of iron and manganese in the ground water.
- The DWASA water supply strategy aims at providing clean water supply in its service area i.e. DCC & Narayanganj within RAJUK jurisdiction and presently provides for about 2162 MLD of water to the Dhaka water supply system. The existing water services heavily relies on groundwater with about 80% of water produced by DWASA is currently sourced from aquifers. However, this needs to be further reduced to stop the continuous decline of the water table. Over the years, the number of DWASA Production tube wells (PTW) has increased to 666 across the city. At present DWASA experiences the system loss of almost 26%.

b. Surface Water

The peripheral rivers of Dhaka– Buriganga, Turag, Tongikhal, Balu, Lakhya and Dhaleswari are the main sources of surface water for the RDP area. According to the Resources Assessment Study (IWM, 2006), sufficient water is available in these rivers round-the-year to fulfill the water supply requirement of Dhaka city. For example, 80% dependable flow in the Lakhya is around 60m³/s and in the Buriganga around 58 m³/s. Total water requirement for Dhaka Water Supply area and surroundings in 2035 will be 4858 million litres per day (MLD) or 56m³/s. Due to pollution the peripheral rivers of Dhaka are not considered as dependable source of safe water supply for future.

The availability of surface water sources for drinking purpose have become a problem for the following reasons:

- Surface water receives pollutants from agricultural, industrial and domestic sources. Insanitary practices of people have greatly contributed to the deterioration of quality of surface water.
- The fecal coliform concentration in most surface water sources in the surrounding peripheral rivers is very high.
- The use of surface water for drinking purpose requires purification and disinfection by elaborate treatment processes.
- The availability of surface water in the dry season is also a constraint for the development of dependable small and large scale surface water treatment plants for safe water supply.

c. Projection of Water Demand

Water demand for the future has been estimated for domestic, commercial/ institutional, slums, fire-fighting and other uses. The main basis of estimating the demand is population projection for the time under consideration. **Table-8.3** describes the estimation of population and water demand for the study areas.

Table-8.3: Population and Demand Estimation

Item / Year	2011	2015	2020	2025	2030	2035
Coverage Area (Sq. Km)	404	404	502	502	611	611
Total Population (Million)	15.12	17.31	19.90	22.33	24.51	26.31
Residential Consumption (MLD)	1815	1947	2239	2512	2757	2960
Slum Consumption (MLD)	189	216	273	307	337	362
Total Domestic consumption (MLD)	2004	2163	2512	2819	3094	3322
Other Consumption (MLD)	300.6	346	433	620	773	831
Total Demand/Consumption (MLD)	2304.6	2509	2945	3439	3867	4153
Fire Fighting (function of population) (MLD)	50	54	63	70	77	83
Sub-Total (MLD)	235.6	2563	3008	3509	3944	4236
Loss (MLD)	576	577	589	619	580	622
Total required Demand/ Production capacity (MLD)	2931	3140	3597	4128	4524	4858

Source: DWASA Report

8.4.2 Future Plan and Direction

a. Goal

ADEQUATE SAFE WATER FOR ALL

b. Objectives and Policies

The objectives and policies of the development proposals are as follows:

OBJECTIVE-WAT 01: TO ENSURE SUSTAINABLE AND SAFE POTABLE WATER

Water is a basic human need. For healthy urban living safe water for all citizens must be ensured. Water has to be safe to keep the users free from diseases that affect productivity and increases cost of living apart from personal suffering.

Policy-WAT/1.1: Prevent Pollution of Water Sources

Water to be safe, the sources of water must be prevented from getting polluted. Prevent contamination of water sources through effective enforcement of laws, regulations, appropriate land use measures and proper watershed management.

- **Strategic Action:**

- Improve water quality through holistic management of the water resources in slowing down runoff, keeping water clean at source, while beautifying the landscape and strict enforcement of legal action.

- **Implementation Tools:**

- DWASA, Department of Environment should conduct drive against water polluters and take punitive action according to prevailing law.
- Regular monitoring is needed to prevent growth of pollution sources around water channels and rivers.
- Attempts would be taken to minimize pollution in the waterways through public education and by building people-water relationship.

- **Implementing Agency:** DWASA, Department of Environment, City Corporations and Pourashavas.

Policy-WAT/1.2: Introduce Loop Closing System for Water Management

There exist number of water resources like rivers, khals, lake and water reservoir in and around Dhaka City which would be protected and preserved for suitable water management and supply through the system of Loop Closing. Loop closing means to retain, preserve and purify the water collected from different sources and to supply the treated/potable water and again, preservation of used water for further drinking purpose through purification. Achieving an adequate and affordable water supply is not enough, equally important is to manage the water demand, to have greater ownership of and to value our water resources. To create beautiful and clean streams, rivers, and lakes with healthy community spaces for all to enjoy, it is necessary to integrate the drains, canals and reservoirs with the surrounding environment in a holistic way,

- **Strategic Action:**

- Introduce a wide-ranging water conservation plan that encourages customers to use water wisely.
- Take initiative to prepare and execute integrated water resource management plan;
- Identify areas to further reduce water consumption and raise efficiency;

- **Implementation Tools:**

- Introduce innovative ideas for transforming existing reservoirs (Hatirjheel, Dhanmondi and Gulshan lake, Kallayanpur and Goranchantbari water retention pond etc.) and water bodies into beautiful and clean streams, rivers and lakes, to create a vibrant City of Water;
- DWASA will encourage everyone in the 3P (**People, Public and Private**) sectors to take joint ownership of Dhaka Region's water resource management.
- Economizing use of water will reduce cost of its collection and will increase water reserve in the aquifer.
- Recycling and reuse of household waste water will reduce pressure on potable sources of freshwater.
- Integration of surface/storm drain with blue network like rivers, khals, lake, water retention pond (existing and proposed) for proper water resource management;
- To encourage to develop a relationship with water and bond with it. It is believed that people who play with water will treasure it even more and want to be guardians of it. This is key to ensuring Dhaka's water sustainability for the future generations.
- 'Use of water' should be a criterion for the green building procedure to promote water conservation within Dhaka metropolitan area. These buildings should be brought under a 'green certification' process and awarded.
- A '**Blue Network**' (**Map-8.7**) integrating various lakes/khals, proposed retention ponds and surrounding rivers should be planned, developed and maintained.

- **Implementing Agency:** DWASA, City Corporations and Pourashavas, DPHE.

Policy-WAT/1.3: Provide Adequate Water to the Urban Poor Community at Affordable Rate

Poor groups in Dhaka city constitute a large share of Dhaka's population. They are the most deprived community in respect of basic urban services. They have to pay for water of a rate which is higher than the high class communities of the city.

- **Strategic Action:**
 - Priority action targeting the poor areas of the city.
- **Implementing Tools:**
 - DWASA and DPHE, in collaboration with NGOs should take up programmes and projects to ensure adequate water supply in poor areas with nominal charge.
 - DWASA, DPHE and City Corporation, Pourashava shall support and promote collective initiative in slums and squatters in accessing uninterrupted water supply.
- **Implementing Agency:** DWASA, DPHE, City Corporations and Pourashavas.NGO.

Policy-WAT/1.4: Encourage Harvesting of Rain Water

Rain water harvesting would reduce pressure on ground water

- **Strategic Action:**
 - Policy decision and incorporation of measures in the building construction rules.
- **Implementation Tools:**
 - DWASA, City Corporations and Pourashavas can start campaign to popularize use of rain water for washing and cleaning purposes.
 - DWASA may reduce water charge as incentive for households having rain water harvesting facilities.
 - Mandatory rain water harvesting system may be included as a condition for approval of building plan.
- **Implementing Agency:** DWASA, City Corporations and Pourashavas, RAJUK.

Policy-WAT/1.5: Introduction of Dual Distribution System-potable and non-potable

The dual distribution system is used to supply potable water through one distribution network and non-potable water through the other. Introduction of dual distribution system would augment public water supply by providing untreated or poorly treated, non-potable water for purposes other than drinking. This would reduce the pressure on potable drinking water sources and the cost of water treatment.

- **Strategic Action:**
 - Take up policy decision in favour of dual supply system.
 - Introduction of advanced membrane technologies for further purification of treated water;
- **Implementation Tools:**
 - DWASA may take up a pilot /demonstration project in this regard. If successful, the system may be gradually extended.
 - Reclaimed water produced from treated water that will be further purified using advanced technologies and ultra-violet disinfection, making it ultra-clean and safe to drink.
- **Implementing Agency:** DWASA and Local Government Agencies.

Policy-WAT/1.6: Ensure Ground Water Recharge Keeping the Building Set Back Space to Remain Unpaved

Over extraction of water from ground water sources is reducing the water reserve. This might lead to scarcity of water and subsidence of the ground level. This measure will help recharging ground water to some extent.

- **Strategic Action:**

- Legalize measures by incorporation in the existing set of building regulations.

- **Implementation Tools:**

- RAJUK should take initiative to amend BC Rules and incorporate the measure to keep mandatory vacant space in the front and sides of a building unpaved for percolation of rain water.

- **Implementing Agency:** RAJUK, DWASA and Local Government Agencies.

BOX-8.1

IMPORTANCE OF INTEGRATED WATER MANAGEMENT PLAN

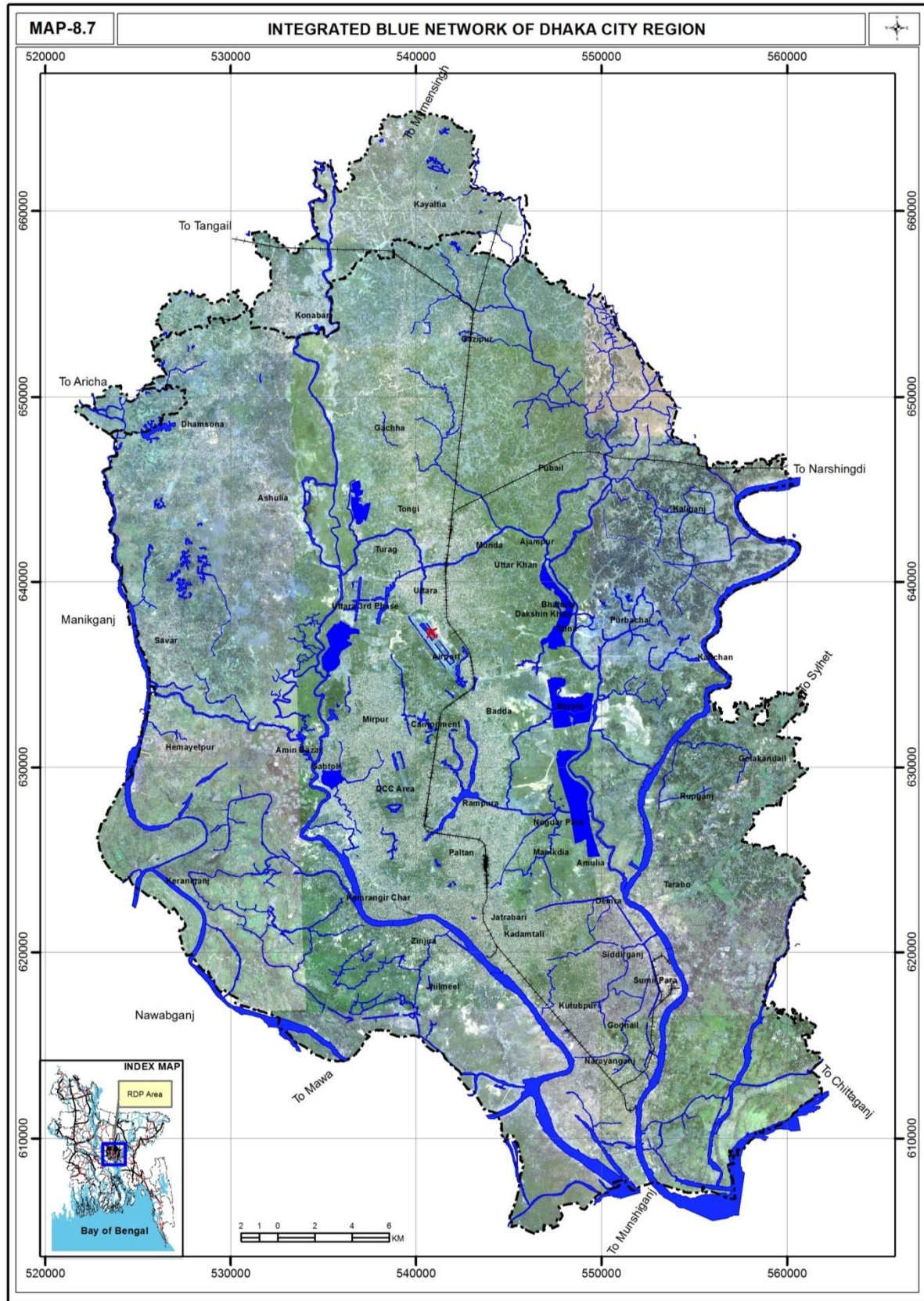
As there is no explicit sign of regional development programs outside core Dhaka, the pressure of increased population in the city is most likely to occur in the coming decade. In that case, the major challenge to face is to supply safe and necessary water for human intake as well as other domestic usages. Encroachment of peripheral rivers emanated from the unplanned and illegal development of the city, associated with indiscriminate industrial and municipal pollution and thus made the treatment of the river water impossible. In addition, the alternative Government plan which involves borrowing water from the Meghna River to treat and supply will undoubtedly cost huge amount of money. In these circumstances, it is necessary to initiate 'Loop Closing' principle to protect, conserve and make sustainably useable the internal water resources of Dhaka metropolitan area. *'Loop closing' can be defined as the processes of collecting water from various sources, conserving, treating, supplying to various users and again collecting the used/waste water to make them usable again.* It is possible to implement the 'loop closing' principle through 'Integrated Water Resource Management Plan'.

The benefits of are as follows:

- Reservoir of safe drinking water,
- Container of flood water,
- Open space and green area,
- Can be used as recreation and stress relieving spots,
- Low-impact water sports, e.g. diving, boating etc can be promoted
- Micro climate within the city can be controlled
- Can be used as internal waterway to ease site seeing for tourists
- Conservation of biodiversity, and many more.

The opportunities are as follows:

- Internal khals (canals), lakes and surrounding rivers,
- The amount of annual average rainfall;
- The location of 'retention ponds' as demarcated in the Detailed Area Plan (DAP)



8.5 Solid Waste Management

Apart from Dhaka North City Corporation and Dhaka South City corporation areas there is no proper structured form of solid waste management within RAJUK area. Recently, two newly declared city corporations, Gazipur and Narayanganj, have been established but, proper solid waste management system is yet to be introduced by them.

8.5.1 Scenario Analysis

Though, Dhaka recently adopted a Solid Waste Master Plan, sufficient waste collection services are not available in most areas of the city. Only 40–60% of Dhaka's waste is collected and transported to the city's two landfills. Uncollected waste is deposited in open dumps and common areas, creating public nuisance and environmental hazards.

a. Waste Generation

Dhaka City generates approximately 1.65 million metric tons of solid waste annually. It is projected to generate more than 5,000 tons of waste each day by 2015, a 47 percent rise from its 2004 baseline of 3,400 tons per day. The waste stream is more than 80% organic matter and contains a wide variety of substances, such as food waste, paper, cloth, agricultural waste, construction debris, metals, hospital waste, and appliances. Per capita waste generation estimates range between 0.29 and 0.60 kilograms per person per day, depending on the individual's level of income (higher income individuals tend to generate more waste).

Table-8.4: Waste Generation and Disposal in Dhaka City

Item	Parameter
Estimated generation (4,000 ton/day)	Municipal Solid Waste (MSW) : 3500t/d → 1800 t/d (collected) 1700 t/d (not collected)
	Industrial Solid Waste(ISW) : 300t/d
	Hospital & Clinical Waste : 200t/d
Generation rate	Domestic waste- 0.34kg/d/person
	(Domestic + business +street) waste- 0.56kg/d/person
Calorific value	All waste average-550 to kcal/kg
	*Required of self combustion- 1200lcal/kg
Share of disposal quantity (1,700 ton/day) by	900 t/d : go to backyard and land filling
	400 t/d : go to road side and open space
	300 t/d : to be recycled by <i>Tokais</i>
	100 t/d : to be recycled at the generation point
Total disposal volume at 2 landfill sites	Wet season average- 1,400t/d Landfill Sites: Matuail and Amin Bazar

From another study, it is revealed that Dhaka city area generates approximately 3500 to 4000 tons/day of residential, commercial and institutional Municipal Solid Waste (MSW), while the DMDP

area generates approximately 7000 tons/day (World Bank, 2007). However, with rapid urbanization, increasing per capita income and changing lifestyle, the rate of MSW generation is also likely to increase as also the percentage of recyclables and non-degradable materials.

All urban local governments within RAJUK area are responsible for waste collection and disposal. In Dhaka City only a small portion of the collected organic waste is diverted before being transported to the city's landfills or deposited in open spaces.

b. Recycling and Resource Generation

Dhaka has historically relied on the informal recycling sector (e.g., waste pickers, of whom there are an estimated 120,000) for the recovery of non-organic materials. In an effort to recover more recyclable materials, the city launched a source separation pilot program in 2012.

One small private composting company is currently collecting (for a fee) organic waste and processing approximately 100 metric tons per day for producing compost, which is sold to the farmers. Dhaka South City Corporation has planned to develop a larger Integrated Resource Recovery Center at Matuail Sanitary landfill site to process waste into compost and to generate electricity.

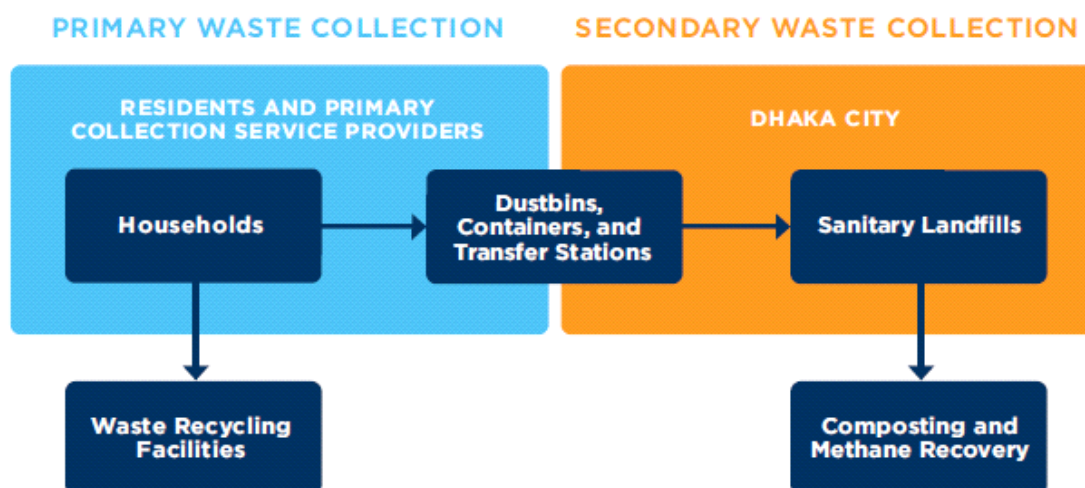


Figure-8.6: Dhaka Waste Collection and Disposal

c. Waste Disposal

Collected waste is first transported on hand trolleys (often by private micro enterprises) from dense neighborhoods to consolidation locations, where it is loaded onto city owned trucks. The waste collected from the municipal waste container or waste bins is carried to the landfill site at Matuail in the south and at Amin Bazar in the north of the city.

8.5.2 Projection of Waste Generation and Landfill Demand

Per capita waste generation depends on individual level of income and higher income individuals tend to generate more waste. It has been found that average daily per person waste generation rate from domestic source ranges between 0.21–0.59 kg. However, in this projection and for the purpose of assessment of landfill demand an average daily per person waste generation rate of 0.5 kg is used throughout the period 2015-2035.

Table-8.5: Projection of TWG and Landfill Waste Volume in RDP Area (2015–2035)

Year	Projected Population (M)	Daily Waste Generation (tons)	Yearly Waste Generation (M tons)	Cumulative Waste (M tons)	Cumulative Landfill Waste Volume(Mm3)
2015	17.31	8,655	3.159	3.159	6.318
2020	19.90	9,950	3.632	20.373	40.746
2025	22.33	11,165	4.075	39.862	79.724
2030	24.51	12,255	4.473	61.432	122.864
2035	26.31	13,155	4.802	84.783	169.566

Source: Compiled by RDP Consultant, RAJUK, 2014

According to McBean and Fortin (1993), a well run landfill can achieve a compacted density up to 600 kg/m³. However, wastes are a mixture of materials with different properties and characteristics. Some materials compact much more readily than others. In this projection, for calculation of waste volume a compact waste density 500 kg/m³ is adopted. A spreadsheet computation is carried out for estimation of waste quantities using population and waste generation rate (0.5 kg). Computed waste quantities are then converted to equivalent landfill volume dividing waste quantities by the compacted specific weight (500 kg/m³) of waste in landfills. Population, total waste generation (TWG) and corresponding landfill waste volume are shown in **Table-8.5**. Some studies show that about 10% of total generated waste is picked and recycled by scavenger in Dhaka. As significant portion of waste dominated by organic waste, total waste can reasonably be reduced by composting of organic waste. At present about 2–5% of total waste get composted. This amount can easily be increased by establishing composting plants commercially. For the purpose of this projection three waste reduction scenarios as shown in **Table-8.6** is simulated keeping recycling as fixed (10%) and varying composting quantities and corresponding landfill waste volumes for different period and waste management scenario is adopted.

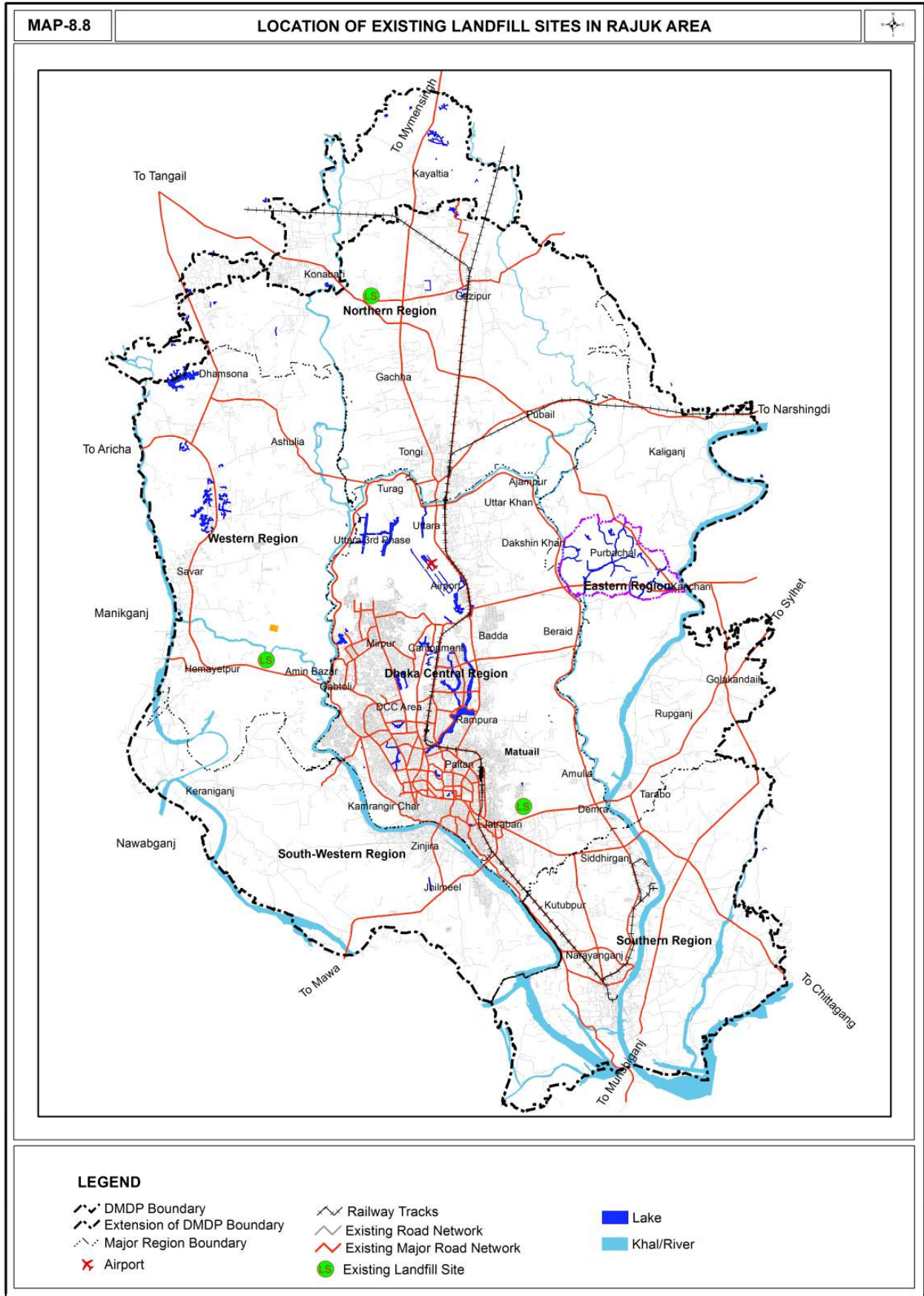


Table-8.6: Three waste management scenario

Scenario (period) : year	Land filling	Recycling	Composting
Scenario A (2015~2020): 2015, 2020	85%	10%	5%
Scenario B (2021~2030): 2025, 2030	80%	10%	10%
Scenario C (2031~2040): 2035	75%	10%	15%

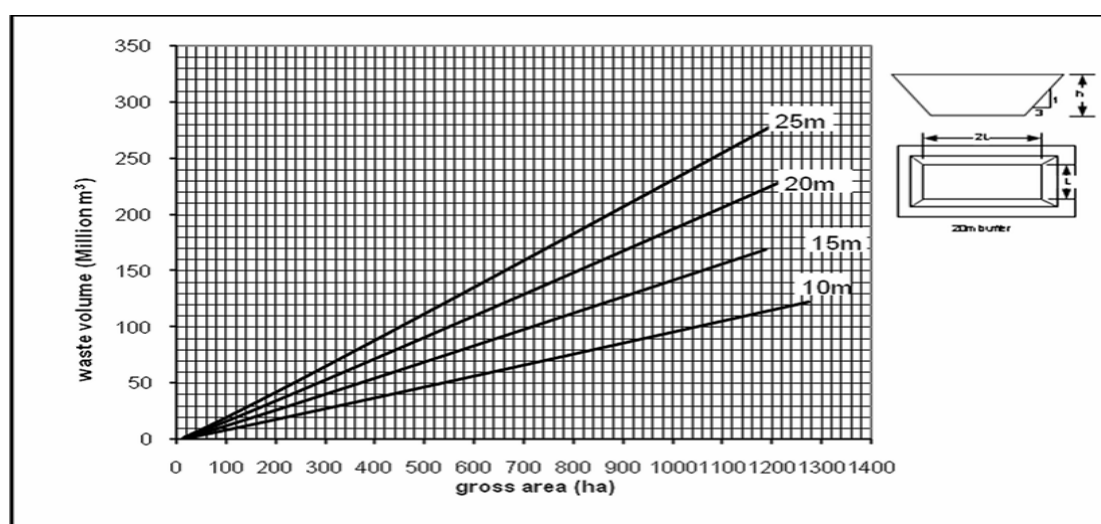
Corresponding landfill waste volume for different period and waste management scenario are shown in **Table-8.7**.

Table-8.7: Projection of Compacted Landfill Waste Volume of RDP area (2015–2035)

Year	Projected Population (M)	Yearly Waste Generation (M tons)	Cumulative Waste (M tons)	Cumulative Landfill Waste Volume(Mm3)	Compacted Landfill Waste Volume(Mm3)
2015	17.31	3.159	3.159	6.318	5.370
2020	19.90	3.632	20.373	40.746	34.634
2025	22.33	4.075	39.862	79.724	63.779
2030	24.51	4.473	61.432	122.864	98.291
2035	26.31	4.802	84.783	169.566	127.175

In this projection, an inverted truncated pyramid shape with 20 meter buffer around the top surface is assumed to be landfill capacity. The *tumulus* is assumed to have a rectangular bottom base (2L × L) with side slope 3:1.

A graph with volume of the *tumulus* vs. area in the landform for different depth is developed and shown in **Figure-8.7**.

**Figure-8.7: Landfill Area Estimation Graph**

In this projection, landfill area requirement is taken and compared for different depths and different period (waste management scenarios) from the developed graph for different waste management scenario. The estimated landfill demand from 2020 to 2035 with different landfill depths are shown in **Table-8.8**.

Table-8.8: Landfill Area Demand During Different Periods and Different Depth

Year	Compacted Landfill Waste Volume(Mm3)	Landfill Area Demand (ha)			
		10m	15m	20m	25m
2020	34.634	400	260	200	160
2025	63.779	660	460	360	300
2030	98.291	1020	700	540	440
2035	127.175	1310	900	680	560

Note: Year 2015 is omitted because of starting point

Even with 25m depth land fill area requirement comes to 160 ha in the year 2020. This is equivalent to 1.6 sq.km of land, which is significantly huge area, and will not be affordable by a land scarce country like Bangladesh. Besides, nobody knows what would happen to the sites when entire site is filled against continuously generating waste. Therefore, more attention should be diverted towards **three R** concepts (Reduction, Reuse and Recycle) instead of **land fill**. Waste reduction strategy would be difficult to achieve in near future, but it would not be difficult to promote waste reuse and recycle.

8.5.3 Critical Issues

The following critical issues have been identified in waste management sector.

a. Poor Waste Management

Poor management of solid waste in the Dhaka Metropolis has aggravated flood problems and increased health hazards, including spread of diseases. The absence of a proper solid waste disposal system meant that many fragile ecosystems have been used as dumpsites for all types of waste.

b. Waste Collection Points Posing as Public Nuisance

Exposed on the street waste collection points in Dhaka city and elsewhere in urban areas are important for collection waste for final disposal. Due to lack of space for their placement, the collection point bins are usually placed right on the road. But they are considered as public nuisance as they create odor and pose as an obstacle to smooth traffic movement. It is necessary to find solution the current exposed on street garbage bins.

c. Absence of Cleaning Project

To ensure effective solid waste management, both the city corporations of Dhaka have undertaken "Clean Dhaka" project which would improve efficiency of collection of solid waste thus positively impacting the water quality of the inland water bodies. However, the Clean Dhaka project is limited only to DCCs areas and no similar initiatives have been taken in the remaining parts of the RAJUK Area. Thus risks of pollution of surface water from improperly managed waste dumps and open landfills would continue in areas outside DCCs. In addition, in absence of regulations for management of municipal solid waste as well as for biomedical and hazardous waste disposal systems is seriously impeded. The risks of pollution of both surface and groundwater would thus continue in the vast RAJUK area despite implementation of "Clean Dhaka" in DCCs. None of the urban local governments other than DCCs have dumping sites. So their wastes are substantially littered all around the city with a small percentage used for land filling. Other city corporations and Pourashavas within RAJUK area need to prepare waste management master plans to effectively deal with solid generated by them.

d. Problems of Land Fill Sites

Matuail landfill is well managed and operated, while in Amin Bazar landfill site, the staffing is quite insufficient and landfill operation is carried out without a site manager and any specific operation plan. The landfill environmental monitoring has not been implemented since the division of DCC in both of Matuail and Amin Bazar landfill sites.

e. Lack of Stress on Community Based Waste Management

The community-based approach to waste collection in residential areas has to be expanded and improve the services and working conditions of service providers to reduce their occupational health hazards.

f. Scarcity of Land for Waste Dumping

As it is evident from **Table-8.8** about 560 ha (5.6 sq.km) of land would be required as land fill area in the year 2035 to dump solid waste generated by about 26 million population. This is a huge area unmanageable by the concerned agencies to be made available for disposal of solid waste. To prepare such a huge land for waste dumping government will have to make compulsory acquisition of agricultural land with huge public money against severe **public opposition**.

8.5.4 Future Plan and Direction

a. Goal

CREATION OF CLEAN AND PLEASANT LIVING ENVIRONMENT

b. Objectives and Policies

Considering the city's rapid growth and insufficient waste services, the need for improved solid waste management following objectives and policies are set to improve solid waste management system.

OBJECTIVE SW 01: TO ENSURE EFFECTIVE MANAGEMENT OF SOLID WASTE

Improper management of solid waste might turn into a major problem to manage final disposal of waste—collection, transportation and disposal sites apart from health problem. Unmanaged waste may turn into a source of, both surface and groundwater pollution and pollution of the total environment (water, air, soil).

Policy-SW/1.1 : Ensure Minimization of Waste Generation

If waste can be reduced at the source, the task of management and disposal will be low. By recycling waste can be turned into resources and can also create employment. Improving the recycling system and infrastructure will continue to be one of the main thrusts in reducing the amount of waste sent to the landfill. More efforts will also be made to move towards closing the waste loop by improving various initiatives to reduce packaging waste.

Box-8.2

CRITERIA FOR LOCATING ALTERNATIVE LANDFILL SITE

- Minimum site size.
- Away from residential population.
- Away from schools, hospitals, or other institutions.
- Far away from streams and aquifer recharge areas.
- Maximum distance from wetlands;
- Minimum distance from main road.
- Acceptable site geology and soil characteristics;

- **Strategic Action:**

- Adopt the policy of three R (Reduce, Reuse and Recycle). "Reduce, reuse and recover" is the cornerstone of most waste minimization strategies;
- Necessity of alternative landfill sites will be considered as least preferred option;
- Introduction of hierarchy classification for proper waste management in order to extract maximum practical benefits from products whilst generating the minimum waste, (**Figure-8.8**);

- **Implementation Tools:**

- Take up programmes and projects aimed at reduction, recycling and recycling of waste. These will reduce the volume of waste.
- Recycling plants may be set up in dumping sites or in collection centres if space is available.
- Reduce excessive usage of plastic bags in the retail sector;
- Introduce more recycling programmes, more publicity for recycling, and recognition for recycling efforts
- Take up project on Bio-energy from waste to energy, bio-sludge, community biogas and landfill gas etc.;
- More recycling bins in public areas like food outlets, convenience stores, supermarkets.
- Promote innovative technologies to recycle and reduce waste;
- Take proper initiative to develop a market for recycled products;
- Popularize "Reduce, Recycle and Reuse" waste among people. Private sector may be involved by offering credit and technology for recycling waste to recover resources.
- Existing landfill sites will be properly managed and there should be incinerators to burn unhygienic waste;
- Locate Landfill sites for Gazipur City Corporation, Narayanganj City Corporation and Savar and Tarabo Pourashava area.

- **Implementing Agency:** Local Government Agencies, RAJUK and NGOs.

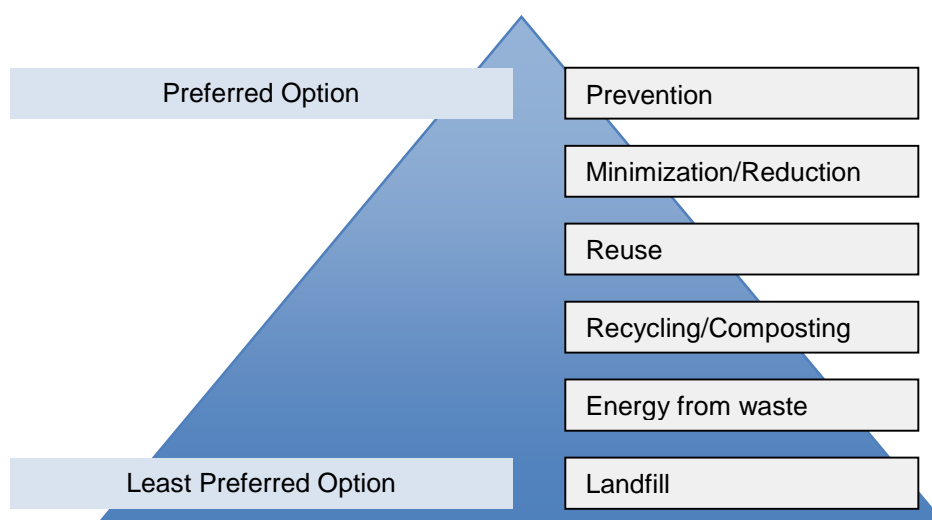


Figure-8.8: Waste Management Hierarchy

Policy-SW/1.2 : Ensure Effective Management and Disposal of Medical Waste

Medical waste is one of the most harmful wastes. They should be handled with care and effectively. Medical wastes carry germs of multiplicity of diseases. Therefore, they should be treated very carefully to avoid any contamination and threat to public health.

- **Strategic Action:**
 - Manage medical waste with care and hygiene.
 - Evolve measures to concede
- **Implementation Tools:**
 - Two Dhaka City Corporations' conservancy departs should have separate sections to handle medical waste.
 - Provide necessary logistics and vehicles to handle medical waste.
 - Proper training should be imparted for safe handling of medical waste.
 - Measures should be taken to establish sufficient number of incinerators at suitable locations.
- **Implementing Agency:** Local Government Agencies and DoE.

Policy-SW/ 1.3: Locate Waste Transfer Stations at Proper Places and Prevent Public Nuisance

Urban services may be divided into repulsive and attractive ones (Passidon 1983), and similarly into those with positive external effects and those with negative ones. Solid waste transfer stations clearly fall within the domains of repulsive services that further create negative external effects. On the other hand, waste has to be collected, and the closer the transfer station or disposal plant is located to the residential areas they are bound to serve. Careful and detailed attention has to be given to the various locational aspects of the station.

- **Strategic Action:**
 - Select strategic location of Solid Waste Transfer Stations with measure to prevent public nuisance.
- **Implementation Tools:**
 - DAP/Action Area Plan should point out appropriate locations for collection points.
 - Engineering solutions may be worked out to place the bins at **underground** with waterproof measures.
 - Consideration of underground network of tunnels of all household waste, instead of bins and to dispatch to waste-treatment centers where it is sorted and deodorized
- **Implementing Agency:** RAJUK, Local Government Agencies and BUET.

Policy-SW/1.4: Take Measures for GHG Mitigation and Low Carbon Development

A major portion of waste is composed of organic materials, which produce methane (CH₄) as they decompose. Methane could be captured for subsequent use or waste could be incinerated to produce electricity. Proper management of urban waste could thus be an important area for mitigation while ensuring a cleaner city. Furthermore, lowered emissions could be traded in the carbon market.

- **Strategic Action:**
 - Capture CHG emission from solid waste for productive use.
- **Implementation Tools:**
 - Technology may be borrowed from abroad through donor assistance to set up power generating plants from organic waste.
 - Develop local technology in collaboration with Engineering Universities and Solid Waste Management NGOs.
 - Private sector may be involved for investing in small scale power plant, if found feasible.

- **Implementing Agency:** City Corporations and Pourashavas, DoE, NGOs, Public Engineering Universities.

BOX-8.3: LOCATION CRITERIA FOR SOLID WASTE TRANSFER STATIONS

Ecological Criteria	Transportation Criteria
1. Odors 2. Waste 3. Rodents 4. Insects 5. Aesthetics 6. Water Pollution 7. Noise 8. Meteorology	1. Infrastructure 2. Proximity to a major road or railway 3. Restriction on truck size and weights 4. Interference with regular traffic volumes
Economic Criteria	Spatial Criteria
1. Construction cost 2. Maintenance costs 3. Transportation costs to and from stations 4. Land value of station and surrounding area	1. Distance from collection areas to station and from station to disposal area 2. Land uses near station site 3. Size of served population and its waste characteristics 4. availability of vacant land 5. Site topography 6. Existing and planned stations 7. Future planning of the community and region

Policy-SW/1.5: Ensure Greater Private Sector Participation in Waste Management

Waste management has important public health implications because it is one of the two main carriers and propagators of infectious diseases. Ineffective solid waste management practices make a poor impression on investors and tourists, and may result in loss of reputation and investment. Greater participation of local people's and private sector bodies in waste management can ensure better waste management as they are the beneficiaries.

- **Strategic Action:**
 - CBOs and private sector to take greater role in local waste management.
- **Implementation Tools:**
 - Ward Councilors in collaboration with local people can take initiatives to arrange CBOs.
 - Private sector may come up with recycling of waste locally to make waste collection a profitable business.
- **Implementing Agency:** City Corporations and Pourashavas, DoE, NGOs.

OBJECTIVE-SW 02: TO PROMOTE HEALTHY LIVING

Healthy living should be promoted among the people by creating health awareness. This will promote preventive health care system leading to reduction of suffering from diseases, cost of Medicare and loss of productivity of human being.

Policy- SW /2.1: Introduce Health and Hygiene Counseling and Healthy Practices at Home and Schools

Family and schools are the two most important places of learning for growing children. Any good counseling in these two institutions lasts almost forever. Children may be taught on cleanliness and hygienic environmental pollution.

- **Strategic Action:**
 - Policy decision and action.
- **Implementation Tools:**
 - Ministry of Education should take the programmes and projects and allocation of budget for project execution.
 - Chalk out details of programme implementation including training of teachers.
 - Publicity for healthy practices may be imparted to families through popular media in the form of publicity, talk show, drama, etc.
- **Implementing Agency:** Ministry of Education, Ministry of Culture.

8.6 Sewerage and Sanitation

8.6.1 Scenario Analysis

The underground sewer network available in Dhaka city covers only 30% of the existing urban area, and 20% of the population. Another 30% of the population is estimated to dispose of their sewage by connecting into the drainage networks and open channels (unhygienic). A small, estimated population of approximately, 320,000 in Mirpur area was designed to be served by a “Small Bore” water-borne

Table-8.9: Sewerage/Sanitation System Coverage in DWASA Service Area

	%Current population Estimated to be covered by the various Sanitation Systems				
	Separate Sewerage	Combined Sewerage	Small Bore System	Improved On-Site Sanitation	Unhygienic Sanitation
2010 population	2,110,000	3,200,000	320,000	2,600,000	2,300,000
% of total population	20%	30%	3%	25%	22%

Table-8.10: Sewerage System of Dhaka WASA

Sl. no.	Structures	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013-2014
1	Sewer Line (Km)	882	882	882	885	885
2	Sewer Connection (No)	61349	61477	63572	64059	64383
3	Sewage Lift Station (No)	29	29	30	30	30
4	Sewage Treatment Plant(No)	1	1	1	1	1

Source: DWASA MIS Report 2013-2014 and Annual report 2012-13

sewerage system. The remaining areas are mostly serviced by localized sanitation facilities like, septic tanks and soak pits that are also mostly poorly or inadequately designed. The sanitation facilities in slum areas are even poorer. A large amount of domestic and human waste is held in-situ these areas, some of which gets washed into the water bodies during the wet season.

Improved on-site sanitation is estimated to be utilized by approx. 25% of the population within the DWASA Service Area, with the remaining 22% served by unhygienic on-site sanitation means, including pit and hanging latrines and open spaces. These figures are shown in **Table 8.10**. The surrounding area within the RAJUK boundary but outside the DWASA service area is dominated by septic tanks and pit latrines.

a. Sewerage and Sanitation System in Dhaka and Surroundings

• Dhaka city

DWASA operates only one Sewage treatment plant at Pagla (PSTP), about 8 km from the city, on an area of 110.5 ha. It was originally constructed in 1978. The plant provides treatment of the wastewater collected by the central sewerage system. Another is under construction at Dasherhandi to serve Hatirjheel project only. PSTP has design capacity of 120 MLD (peak flow rate) while the current sewage generated within the catchment served by the centralized sewerage system is approximately 250-300 MLD.

Due to damage of the trunk sewer mains and sewerage system, the actual flow rate entering the Pagla STP is approximately 30-40 MLD, i.e. the treatment plant is significantly under-loaded and should provide a high level of treatment.

- **Gazipur and Narayanganj City Corporation**

Existing sanitation system in Gazipur City Corporation comprises exclusively pour flush toilets with septic tanks or pit latrines. Septic tanks are widely used within urban areas of central Gazipur and surrounds, but the exact number is unknown, though to be significant. They are built for by individual households. Pit latrines are also widespread. The current number of pit latrines in the City Corporation is 34,912 comprising home-made, single and twin pit pour flush latrines with septic tanks and 9 public toilets to serve 14,855 households. A considerable part of the inhabitants use the public toilets. In addition, the existing sanitation system in Narayanganj City Corporation is almost same as Gazipur City Corporation which comprises exclusively pour flush toilets with septic tanks or pit latrines. Sewer system includes conventional and non-conventional sewer. Septic tanks are widely used within urban areas and its surroundings. There are 11 of public toilets, 41,018 of sanitary latrines and 13969 of un-hygienic latrines on account of December 2013 in Narayanganj City Corporation areas.

- **Savar, Tarabo and Kaliganj Pourashava and Tongi Town**

The sanitation of the **Savar Pourashava** has inherent problems. No disposal and treatment facilities are available in the Pourashava. No piped water borne sewerage system is available. In the Pourashava 411 households have water sealed latrines with septic tank; 255 households do not have hygienic latrine. There are six public toilets and ten community toilets in the Pourashava.

In **Tongi Town** sanitation has its inherent problems. The Pourashava area has 2 disposal and treatment facilities. Though there is no water borne sewerage (pipe sewerage) system in the Pourashava. The Pourashava has 37,321 sanitary latrines for 130244 households. Apart from the sanitary latrines, the Poursahava has 10 public and 82 community latrines. The Town has 6,498 water sealed latrines and 27,283 pit latrines.

No disposal and treatment facility and piped water borne sewerage system is available in **Tarabo Pourashava**. About 74% households have water sealed latrines, 9% have septic tank and 17% use unhygienic latrines. There are four public toilets in the Pourashava.

In **Kaliganj Pourashava** no water borne piped sewerage system exists. Most poor families use water seal latrines. In rural areas, sanitary latrines are used, mostly provided by the NGOs. In the Pourashava 84% households have water sealed latrines, 12% have septic tank and 4% use unhygienic latrine. There is one public toilet in the Pourashava.

b. Projection of Sewage Production

Based on an analysis of the water supply system, per capita water consumption at the sewerage master plan design horizon of 2035 has been estimated at 130L/c/d and considering typical wastewater discharges of 60-80% of water consumption (choose nominally 70% rate of return to the sewer system), the per capita waste water disposal is 91L/c/d. For the DWASA service area, based on the water consumption and waste water discharge, the total amount of waste water currently discharged is estimated to be 1250MLD. The summary Table-8.12 indicates the waste water produced within DWASA area by the year 2035.

8.6.2 Critical Issues

Following are the critical issues involved with the present sanitation system.

a. Limited Sewerage Network

Sewer network of Dhaka city covers only 30% of the existing urban area, and only 20% of the population. As a result large amount of cities sanitary waste is dumped into the drainage system and unsanitary latrines are wide spread.

b. Highly Unhygienic Sanitation in Slum and Squatter Areas

The Sanitation Facilities in Slum and Squatter areas are even poorer, where hanging and pit latrines are rampant. A large amount of Domestic and human waste is held in-situ these areas, some of which gets washed into the water bodies during the wet season endangering the livable environment.

c. High Dependency on Septic Tank and Pit Latrine Outside Sewerage Network

The surrounding areas including sub-urban local government areas within the RAJUK but outside the DWASA service area, is dominated by septic tanks and pit latrines.

8.6.3 Future Plan and Direction

a. Goal

HYGIENIC AND AFFORDABLE SANITATION FOR ALL

b. Objectives and Policies

Following are the objectives and policy proposals to improve future sanitation.

OBJECTIVES-SANI 01: TO ENSURE HYGIENIC AND AFFORDABLE SANITATION FOR FUTURE POPULATION

To ensure health of the future city dwellers there is need to provide affordable hygienic sanitation for future city population.

Policy-SANI/1.1: Ensure Separate Systems for Transportation of Sewage and Storm Water

The future sewerage system is to be designed based on a 'separate system' concept whereby used water is collected separately in a network of underground sewers that lead to a treatment plant whereas stormwater and surface runoff are collected in open drains and channelled to rivers and reservoirs.

- **Strategic Action:**
 - To ensure public health human waste should be strictly separated from storm water with safe sludge management
- **Implementation Tools:**
 - DWASA may initiate phase wise projects to introduce separating storm and waste water.
- **Implementing Agency:** DWASA, City Corporations and Pourashavas.

Policy-SANI/1.2: Provision of Network Based Sewerage in Sub-urban Centres

Taking account of the future pressure of population and the impacts of unhygienic sanitation the suburban centres covered by Pourashave should be provided with network based sewerage system.

- **Strategic Action:**
 - Take up policy decision in favour of extension of sewerage coverage and adequate budget allocation.
- **Implementing Tools:**
 - DWASA take up master plan for gradual extension of sewerage coverage.
 - Seek government/donor fund for preparation and execution of master plan.
 - Take measures to extend DWASA area commensurate with RAJUK area.
- **Implementing Agency:** DWASA, City Corporations, Pourashavas, and Cantonment Boards.

Policy-SANI/1.3: Promote Adequate Hygienic Public Toilet Facilities in all Busy Areas of Urban Centres

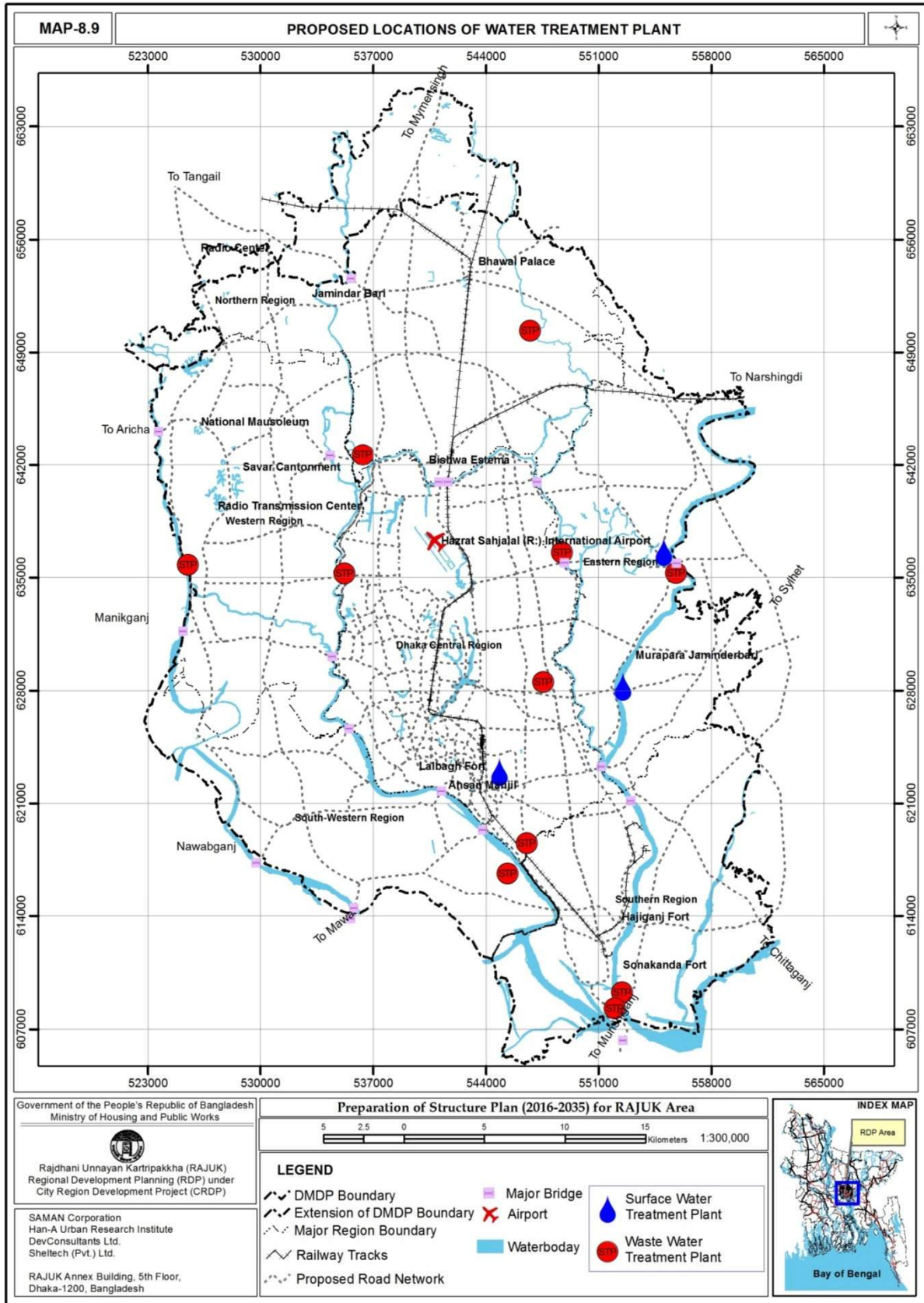
Adequate public toilet facilities are necessary at places where people congregate such as sleeping area, educational institutions, railway stations, bus stations, river stations, parks, markets and other public places. Toilet facilities are also necessary for hawker centres and floating people.

- **Strategic Action:**
 - Identify suitable locations for providing public toilet facilities.
- **Implementation Tools:**
 - City Corporations and Pourashavas should take up more public toilet projects in their respective areas.
 - Adequate budget should be sanctioned for public toilet projects.
 - Public-Private-NGO partnership approach may be explored for development and maintenance of public toilet facilities.
 - Develop and maintain Mobile Public Toilet facilities where space is not available for permanent toilet facilities.
- **Implementing Agency:** City Corporations and Pourashavas,NGOs.

Policy-SANI/1.4: Evolve Affordable and Hygienic Sanitation for Poor Areas

Hygienic and low cost appropriate technology (e.g. twin pit, eco- sanitation) should be evolved and promoted in poorer sections of urban areas as well as in other small to medium size urban centres to serve mostly the low income people.

- **Strategic Action:**
 - Undertake study on low cost hygienic sanitation.
- **Implementation Tools:**
 - Undertake study and research on low cost sanitation to evolve suitable method.
 - DWASA, City Corporations and Pourashavas to take up low cost sanitation Project.
 - Initiate searching for donor funding.
- **Implementing Agency:** DWASA, City Corporations and Pourashavas.



8.7 Energy and Telecommunication

8.7.1 Scenario Analysis

In Bangladesh 47% of the population has access to electricity, the per capita consumption of electricity is only 220 kWh (compared to 443 kWh in India and 2440 kWh in China). The primary cooking fuel in urban Bangladesh is natural gas in the eastern and southern part of the country. It is widely used as fuel in manufacturing also. Bangladesh has 20.5 TFC recoverable natural gas reserve and 420 million tons of coal reserve. Currently, electricity generation heavily depends on gas (about 88%) whereas domestic coal imported diesel, hydro power contributes for only 12% of electricity production. In the power System Master Plan, the target composition of power supply as of 2030 is set at 50% for domestic and imported coal, 25% for imported (LNG) and domestic natural gas and 25% for other sources (such as oil, nuclear power and renewable energy). Government of Bangladesh is giving priority in the overall development of energy sector. During the last decade about 20% of the public sector investment was given for the development of the energy sector.

The capital city of Dhaka itself consumes about 40% of the total generated electricity; and the demand for electricity is increasing by 10% annually. Two major agencies are responsible for power distribution namely, Dhaka Power Distribution Company Limited (DPDCL) and Dhaka Electricity Supply Company (DESCO). In addition Rural Electrification Board also is responsible for distribution of electricity in the rural and suburban areas of the project area.

Current maximum demand of electricity in DESCO area is 720 MGW, and in DPDC area is 1280 MGW. There are few hundred industries (including garment industries) which consume about 37% of electricity, the residential use is about 50% and the remaining 13% is for commercial purpose. During summer season there is shortage of electricity (due to use of electricity for irrigation purpose) which forces electricity departments to impose load shedding causing discomfort to consumers. In addition to electricity department some quick rental power company (as a short term measure) supplies power to DESCO, DPDC and REB at a rate almost three times the normal rate, government has to subsidize huge amount of fund for this purpose. The Siddhirganj and Haripur power stations supply bulk of electricity in the region.

8.7.2 Future Plan and Direction

Utility services are essential parts of urban living. But most of the issues concerning, gas, electricity and telecommunication have very little attachment with spatial planning. There are separate public and private agencies to manage these services within RAJUK area. All these agencies have their own plans and programmes for future development of their respective services. It is recommended that all these agencies, during extension of their services, give priority to RAJUK land use and development plans. It is also recommended that no service connection should be provided to buildings that are not approved by RAJUK. This will compel people to develop their buildings following building construction rules. Titas Gas is responsible for gas supply in RAJUK area. To economies use of gas it is planning to introduce meters. Electricity is handled, apart from PDB and REB, some public limited companies. To ensure proper collection of revenue they are in the process of introducing pre-paid meters. They should aim to ensure uninterrupted power supply. In telecommunication sector primary role is played by the private sector companies. They are in constant effort to improve their services with minimum cost to maintain their competitiveness in the free market finally benefiting the consumers. Government provides infrastructure for IT connectivity. To enable increased connectivity to more government has to provide infrastructure at low cost. This will expand business and export in the IT Sector.

a. Goal**REGULAR AND SUSTAINABLE ENERGY SUPPLY AND EASY CONNECTIVITY****b. Policies**

To ameliorate the energy problems of the city, the following policies have been recommended to attain selected development objectives.

Policy-Eng/1.1: Ensure Energy Efficient Land Use Planning

Proper landuse Planning can be used to reduce energy consumption in a variety of ways;

- **Strategic Action :**
 - Minimize transportation requirement;
 - Encourage mixed use development;
 - Make nonautomotive mode convenient.
- **Implementation Tools:**
 - Promote development that reduces the average distance between origin of a trip and the destination, for example introduction of school zoning concept.
 - Locate the workplaces within the walking distance;
 - Mixing of commercial and retailing uses with residential uses may permit shorter average commuting and shopping.
 - Proper application of "Green Building Code" that mandate a variety of energy saving.
- **Implementing agency:** RAJUK, NHA, LGED, City Corporation, Pourashavas

Policy-Eng/1.2 : Research for Alternative Sources of Fuel/Energy

In view of new renewable energy or energy efficiency, it is necessary that alternative sources of energy should be searched.

- **Strategic Action:**
 - Undertake more research and development initiatives for renewable and energy efficiency projects.
- **Implementation Tools:**
 - Take up programmes and projects for research and innovation on alternative energy.
 - Allocation of budget for research.
 - Introduction of technologies on solar-powered vehicles for road and water communication;
 - Introduction of technologies on wind energy for both utility scale and micro generation;
 - Take up project on energy storage system on renewable power sources;
 - Promoting energy conservation through the efficient use of energy in the industrial, building, transport and consumer sectors.
 - Promoting the use of cleaner energy sources such as natural gas and renewable energy sources.
- **Implementing Agencies:** BUET, PDB, DESA, DESCO, Titas Gas, Petrobangla and IDCOL.

8.8 Educational Facilities

Social and community infrastructure, particularly, the provision of education facilities, are the key to sustainable growth in the urban sector. As with economic growth, however, this sector owes much to national policies, which establishes, monitor and update targets, such as for example, the age of compulsory education.

8.8.1 Scenario Analysis

Human resource development is at the core of Bangladesh's development efforts and access to quality education is critical to poverty reduction and economic development.

RAJUK area has over 1500, both, government and private school facilities (elementary, primary, and high schools). Most of the schools operate on the traditional calendar system (nine months of school and three months of vacation). However, all schools do not offer education of same quality. This compels most parents rush to institutions that impart quality education. This leads to over burden of students in particular institutions leading to severe traffic congestion during particular time periods in areas where they are located.

a. School District Concept

Presently, the management of the education system falls under two ministries - the Ministry of Primary and Mass Education (MoPME, responsible for primary education and mass literacy) and the Ministry of Education (MoE, responsible for secondary, vocational and tertiary education). To minimize this dual management system, RDP Consultants suggest a new concept of Unified School District in RAJUK Area.

Under this concept children of a particular locality must attend schools in their locality. Education within the entire City region will be provided by the RAJUK Unified School District (RUD). MoE and RAJUK will work jointly for managing and distributing the education facilities within the RAJUK Area. The concept of school districts is pretty common in developed world; and nowadays even in many advance Asian countries.

b. Assessment of Future School Requirement

Projected demand for educational facilities with the RAJUK area by the year 2035 has been presented in the below Table-8.11.

Table-8.11: Projected Educational Facilities Requirement of RAJUK Area

Facilities/Year	2020	2025	2030	2035
Primary School (Unit)	2085	2507	3118	3544
Secondary School (Unit)	546	724	917	1050

Source: Compiled by Consultants

c. Considerations on Primary Schools:

- Ideal Standard is 1per 7000; present situation is 1 per 14000
- Age group 5 to 9 (15%), Enrollment 70%, 75%, 85% and 90% has been considered in the year 2020, 2025, 2030 and 2035 respectively.
- 50 seats have been considered in each section;
- Double sections, double shifting has also been considered.
- Surface area is minimum 1 acre including playground
- Can also be dual use (both primary and secondary school)

d. Considerations on Secondary Schools:

- Age group 10 to 14 (10%), Enrollment 55%, 65%, 85% and 80% has been considered in the year 2020, 2025, 2030 and 2035 respectively.
- 100 seats have been considered in each section;
- Double sections, double shifting has also been considered.
- Surface area is minimum 1.5 acre including playground
- Can also be dual use (both primary and secondary school).

8.8.2 Future Plan and Direction**a. Goal****ENSURE QUALITY EDUCATION LOCALLY****b. Objectives and Policies**

Following are the objectives and policies to improve education system in RAJUK area.

OBJECTIVE-EDU 01: TO REVITALIZE LOCAL EDUCATION FACILITIES TO REDUCE TRAVEL DISTANCE

Traditional system allows schools to be set up anywhere and wherever people like to. This creates a precarious traffic condition when, due to high population density, large number of schools spring up in one particular place. This can be broken down by introducing **school district concept**. As part of the social infrastructure, decentralized education facilities, especially primary schools of uniform standards can play a key role in creating a spatial order.

Policy-EDU/1.1: Introduction of School District Concept

School District Concept says that local children should go in local schools. This is necessary to avoid long travel to schools, which is cumbersome, costly and sometimes hazardous for children. For Dhaka travelling to long distance school means adding to traffic congestion in the city streets.

- **Strategic Action:**

- MoE and RAJUK will work jointly for managing and distributing the education facilities within the RAJUK Area;

- **Implementation Tools:**

- Take up a long term project to improve quality of education in all schools through better management. So that parents are encouraged to send their children in local schools.
- RAJUK could take a study project on "**School Zoning**";
- Ministry of Education and the Ministry of Housing and Public Works could work jointly to maintain and ensure uniform standards and facilities for all schools within RAJUK area.
- Increase ancillary facilities, like, play field and sports accessories, library are needed to attract local children to schools. The schools who do not have play fields can share local play fields for school children with time sharing. Make it mandatory to have library in every school.
- No new school in the city periphery should be accorded approval without playing area and sports facilities.
- Exchange Local Facilities for Enjoyment of Local School and Local Neighbourhood Children. A time arrangement may be made to allow local children to play in local school play grounds after school. Authority in charge of local play fields should allow local school children play in local play fields. Similarly, auditorium facilities may also be shared.
- Location suitability study for educational institution can be taken for new areas.

- **Implementing Agency:** Ministry of Education, Ministry of Housing and Public Works RAJUK, City Corporations, Pourashavas.

Policy-EDU/1.2: Creation of Campus Town

- **Strategic Action:**
 - Locate the potential areas for developing as Campus Town;
- **Implementation Tools:**
 - Indicative potential locations for developing the area as Campus Town have been provided in the Structure Plan (**Please see Map-8.10**);
 - Detail out plans in the Detailed Area Plan (DAP) with appropriate shared ancillary services;
 - Allocate land to private education facilities with conditions;
 - No more private university should be permitted within Core Dhaka City area.
- **Implementing Agency:** Ministry of Education, RAJUK, City Corporations, Pourashavas.

8.9 Health Care Facilities

8.9.1 Scenario Analysis

Convenient, accessible and affordable health care services are essential for the well being of a city's residents. By virtue of its large population catchments and its role as the nation's capital Dhaka City Region offers a wide range of health facilities from the all parts of the country. Health care facilities are provided either by the Ministry of Health and Family Welfare or private institutions.

Adequate public health care facilities must be made available to the community as a whole. The government and its agencies are principally responsible for ensuring that those in the lower income groups are able to easily access affordable health care facilities.

8.9.2 Assessment of Future Requirements

There are about 30,000 registered doctors in Bangladesh; the doctor-population ratio is 1:4000 which is certainly inadequate for the health needs of the population. To retain or increase the present average life expectancy, improved health conditions have to be ensured. So the number of hospital beds have to be raised to meet future requirement may be at the rate of one for every 500 people. The number of beds required for the projected population of RAJUK area, for the year 2020, 2025, 2030, and 2035 are 39,716, 44,567, 48,913, and 52,504 respectively have been presented in **Table -8.12**.

Table-8.12: Recommended Planning Standards for Health Facilities

SL. No	Category	Pop. / Unit (approx.)	Plot Area
1	Hospital A (501 beds & above)	5.0 lakh	2.5 ha to 4.5 ha
2	Hospital B (201 beds to 500 beds)	2.5 lakh	1.5 ha to 2.5 ha
3	Hospital C (101 beds to 200 beds)	1.00 lakh	0.5 ha to 1.0 ha
4	Hospital D (Upto 100 beds)	1.00 lakh	0.25 ha to 0.5 ha

Source: Compiled by Consultants

Table-8.17: Projected Requirement of Health Facilities in RAJUK Area

SL. No	Category	Year 2020	Year 2025	Year 2030	Year 2035
1	Hospital A (501 beds & above)	40	45	49	53
2	Hospital B (201 beds to 500 beds)	79	89	98	105
3	Hospital C (101 beds to 200 beds)	199	223	245	263
4	Hospital D (Upto 100 beds)	199	223	245	263

Source: Compiled by Consultants

8.9.3 Future Plan and Direction

a. Goal

HEALTHY LIVING FOR ALL

b. Objectives and Policies

Following are the objectives and policies to improve health facilities in RAJUK area.

OBJECTIVE-HCF 01: TO PROVIDE HEALTHCARE FACILITIES IN ALL PARTS OF RAJUK AREA

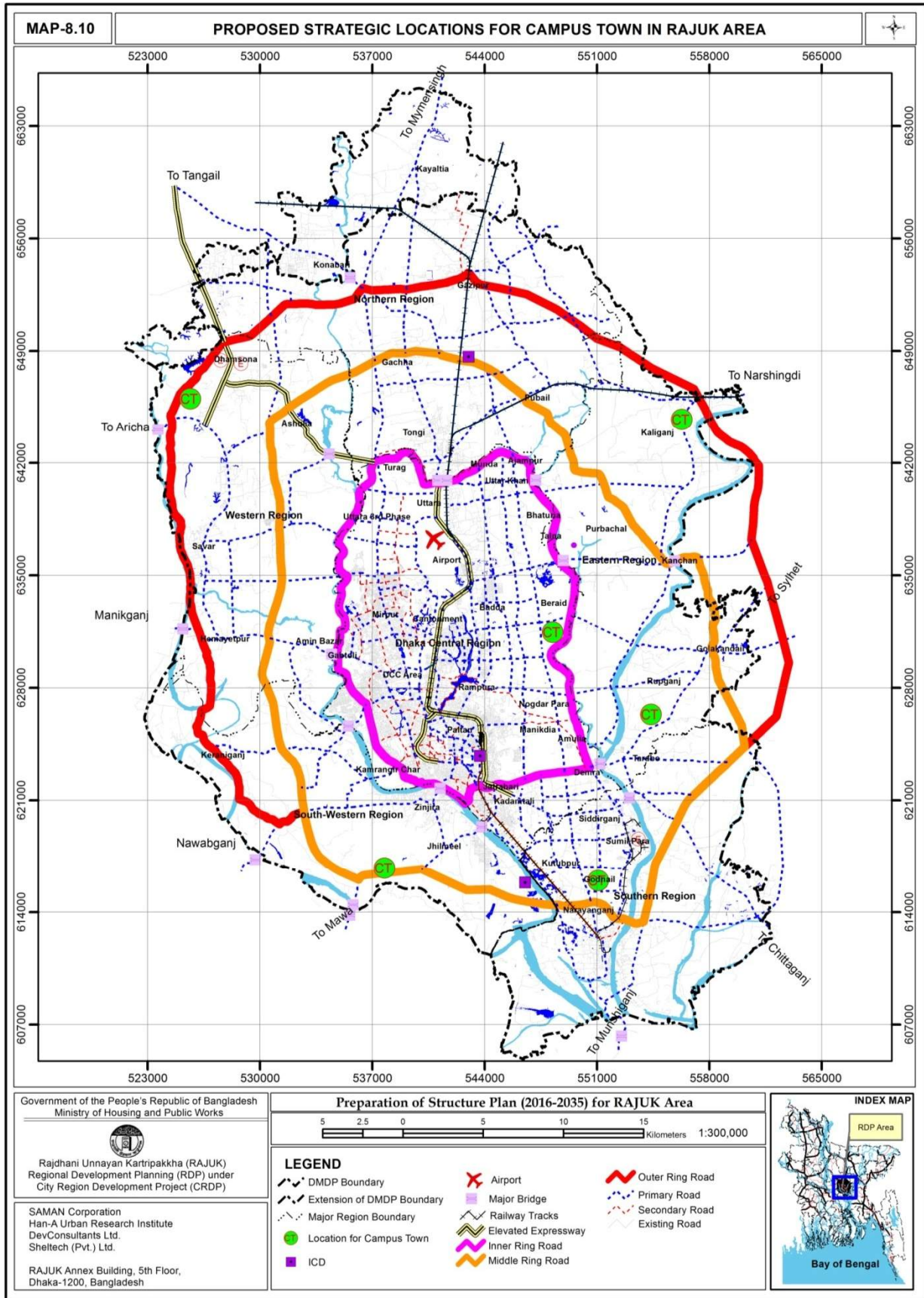
Coordination in health facilities is required to avoid wastage of resources and equal access to facilities by people living in different parts of the city. This will make best use of public health facilities they should be provided in coordinated way.

Policy-HCF/1.1: Provision of Community Clinic in Each Ward/Union

- **Strategic Action:**
 - Select Potential location through extensive consultation with local government agencies.
- **Implementation Tools:**
 - Ministry of Health and Family Welfare should take up project to provide at least one community clinic in each ward/union within the RAJUK's area.
- **Implementing Agency:** Ministry of Health and Family Welfare, RAJUK, and Local Government Agencies.

Policy-HCF/1.2: Ensure at Least One Hospital in Each Regional Center

- **Strategic Action:**
 - Locate potential locations for developing general healthcare zone in each Regional Center.
- **Implementation Tools:**
 - Considering high density of population at regional level and the hassle involved in accessing health facilities in central area, Ministry of Health and Family Welfare should take up general hospital project in each of the six regions.
 - Location suitability study for health facilities may be taken.
- **Implementing Agency:** Ministry of Health and Family Welfare, RAJUK, and Local Government Agencies.



CHAPTER 09 PROTECTING NATURAL AND HEALTHY ENVIRONMENT



CHAPTER 09

PROTECTING NATURAL AND HEALTHY ENVIRONMENT

9.1 Introduction

It is important to respond to the environmental issues facing by Dhaka City by taking appropriate preventive, mitigation or remedial measures. It is necessary to protect and enhance the environment effectively to meet the challenges arising from the intensifying population growth, added by climate change effects. Environmental planning covers a wide range of concerns having to do, generally, with minimizing the damage that human activity does to the natural environment.

9.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of existing environment and the policies proposed in the Structure Plan.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Strong presence of natural environment in suburban areas of the city. • Substantial supply of rain and water during monsoon. • Water courses around Dhaka city for discharge of waste water after treatment. • Natural green in suburban areas. 	<ul style="list-style-type: none"> • Relocation of Hazaribagh Tannery area would provide a substantial area for urban development and help to improve the environment;
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Surface water pollution. • Degradation of environment due to mismanagement of solid waste. • Presence of high level of SMP in core city environment. 	<ul style="list-style-type: none"> • Depletion of greenery in and around the city. • Filling and encroachment of waterbody. • Absence of designated location for hazardous and noxious industries. • Over extraction of ground water. • Haziribagh Tannery area poses a serious threat to the environment, public health, surrounding areas and contributes river pollution; • Climate change will compound problems of environmental degradation and lead to deterioration of ecosystems, adding yet another dimension to poverty. • Unplanned and uncontrolled urban expansion

9.3 Scenario Analysis

Dhaka's fast growing population and concentration of services and industries and higher consumption of natural assets and resources are the key factors responsible for degradation of overall livable environment. The urban poor settled in unsafe areas are an additional factor contributing to environmental degradation. These conditions, allied to inadequate infrastructure (water supply and sewerage) and ineffective planning, and grossly insufficient enforcement, are amongst the greatest threats to Dhaka's future sustainable development. These issues have been highlighted in the following sections.

9.3.1 Climatic Condition and Potential Climate Change Impact

Dhaka has a tropical climate with four meteorological seasons like, pre-monsoon (May to June), Monsoon (July to September), Post-monsoon (October to November) and Dry (December to April). Average annual rainfall ranges from 1700 mm to 2200 mm. About 70% rainfall occurs from June to September. Mean monthly rainfall during the period is between 300 mm to 450 mm.

Temperature of the Dhaka city region ranges from 50°C to 43°C. The highest temperature generally occurs during April sometime exceeds 43°C. One study (BCAS) indicates increase in maximum and minimum temperatures in Dhaka city, leading to hotter summers and cooler winters. In the last 100 years the average temperature in Dhaka has increased by 0.50 degrees Celsius, and in the next 50 years it is expected to increase by another 1.5 to 2 degrees. Pre-monsoon rainfall will predominantly increase though the monsoon, post monsoon and dry season rainfall will show insignificant changes. 3-day consecutive maximum rainfall has increased by 0.1% and average peak discharge at major rivers is showing increase. The study also reveals that the average temperature in the metropolitan area is 2 degrees Celsius hotter than in the peri-urban zones surrounding it, turning the city into a "heat island". On the other hand, loss of urban open space also indicates the densification of built-zones that retain heat. As a result, Dhaka is gradually getting hotter every year.

Traditionally, in Dhaka region, the rainy season starts in mid-June and continues for two months, but now it is getting shorter but more intense. The change throws Dhaka's drainage system ineffective, while the wetlands that form the essential part of the drainage system are being gradually reduced.

Table-9.1: Summary of Climate Change Vulnerabilities for Dhaka

• Changes in Means

Changes	Potential Impacts
Increase in temperature	Increase energy demand for cooling
	Degradation of air quality
	Scarcity of water
Rainfall increase	Increase risk of flooding
	Increase risk of water logging
	Increase risk of in-migration due to river bank erosion

• Changes in Extremes

Changes	Potential Impacts
Flood	Damage to households in slum and squatter areas
	Damage to roads and other infrastructures
	Damage to utility services
	Spread out of water borne diseases
Drought	Severe ground water scarcity
Heat or cold waves	Short term changes in energy demand
	Health stress due to extra heat or cold

The existing climate change induced impacts in Dhaka City are, temperature variation, erratic rainfall, flood and water logging, cyclone, climate induced health outbreak. Furthermore, climate change has compounded problems of environmental degradation and has led to deterioration of ecosystems, adding yet another dimension to poverty.

A long-term proactive approach might provide a practical and sustainable solution to the threat of wide range of seasonal variations with unpredictable characteristics, and consequence.

9.3.2 Ecological Resources and Biodiversity

Biodiversity refers to the variety of the biological resources e.g. living organisms, gifted by the nature for the existence of mankind. Ecological Resources and conservation includes management of biodiversity (Flora and Fauna) and water resources (surface and ground).

Wetland ecosystems are the major habitats of flora, wildlife and fishes. These aquatic resources have been subjected to rapid degradation as a result of population pressure, habitat destruction and other anthropogenic as well as natural causes. Wetlands play an essential part in the regulation of river flow; it is decisive to the balance of ground water level as well as rivers and important for the sustainability of biodiversity. Wetlands ecosystems help regulate climate change by storing and capturing carbon. Wetland plays important role as carbon sinks to mitigate the effects of climate change.

Furthermore, wetland is one of the key components of ecotourism. The reduction of wetland is abolishing the rare pleasant precious recreation sites within the clumsy city. Some traditional livelihood like boating, fishing, collection of wetland weeds and lilies are disappearing as wetlands are being depleted.

Dhaka's water network and water bodies, was once integrated into the city's fabric and was very important for its drainage capacity. But now the wetland in and around Dhaka is degrading at an alarming rate. One study (UNDP, 2012) indicates that due to the rapid urbanization and increased population, both the seasonal and permanent wetland is degrading. Study reveals that permanent wetland has been reduced from **14 % to 4 % between 1967 to 2010**. BCAS study, covering the development of the city from 1960 to 2008, notes that about 52 percent of the lowlands and 33 percent of the water bodies - rivers, lakes, etc. - around Dhaka have been lost to urbanization.

The vegetation of Dhaka City has a variety of indigenous and exotic species especially, parks and gardens. It is estimated that nearly 41-46 parks/gardens have a wide variety of plants and trees. Besides, local species, many exotic species are planted along the roadside, old secretariat area and in residential bungalows for beautification.

A large number of bird species are 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 there during winter. No wild animals inhabit the project areas.

The flood plains provide the most productive and diverse freshwater faunas. Over 3000 species of plants and 400 species of fish and other aquatic fauna depend on wetlands for whole or part of their life cycle. The seasonal flood waters inundating the plains renew this aquatic life support system for millennia, enriching the soils and washing away pollutants.

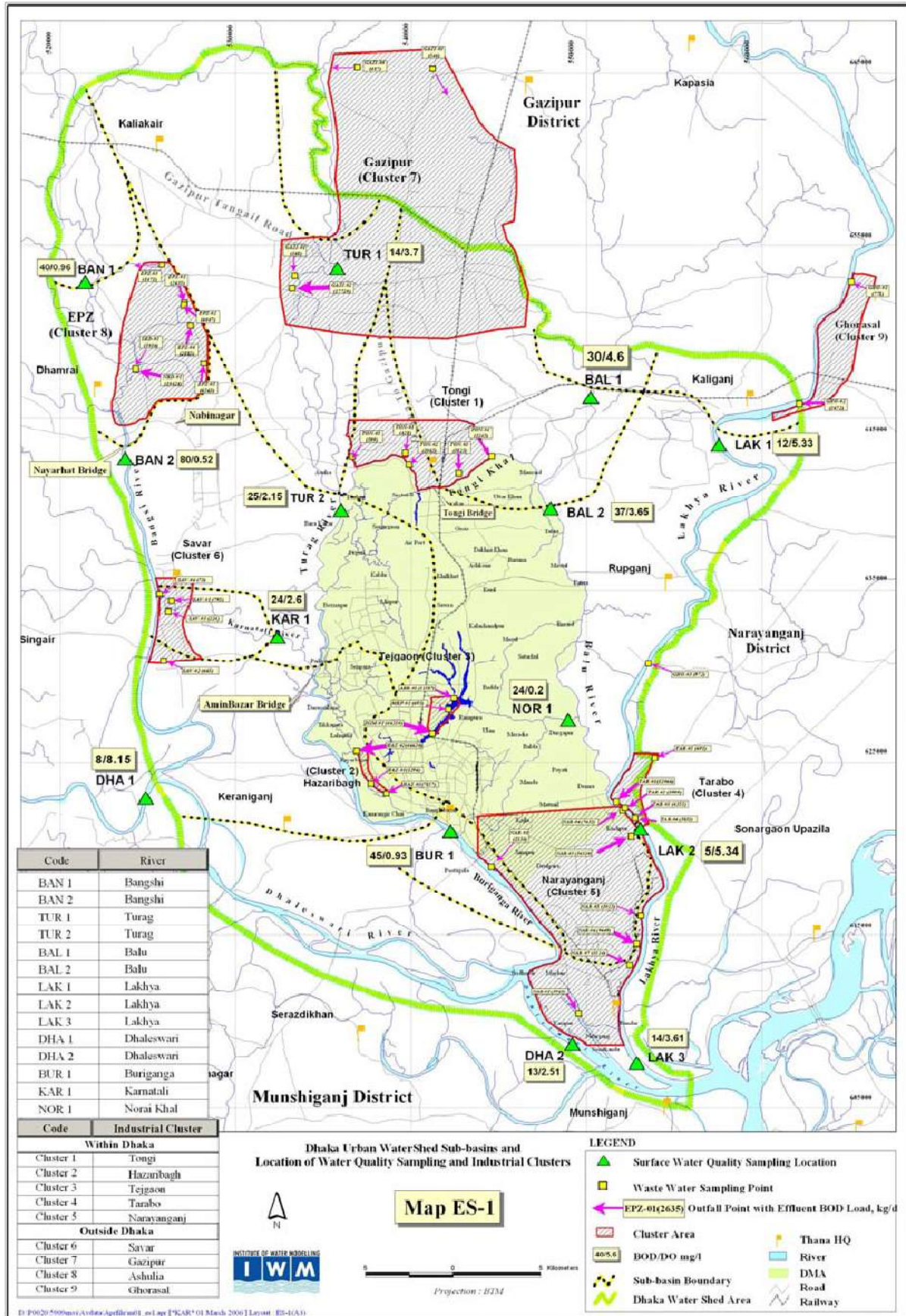
9.3.3 Water Resources and Quality

The core Dhaka City is encircled by a number of rivers- the Bangshi, the Buriganga, the Sytalakhya, the Turag, Tongi khal, the Balu. The river water, however, has altered drastically from its natural state in terms of physical, chemical and microbiological composition and lost its suitability for any safe and beneficial use. Water Quality of the Buriganga, Turag, Balu and Sitalakhya rivers have reached an alarming level and the dissolved oxygen (DO) in many river water has almost reached the zero level in dry season. As the DO content of the river water as decreased below the critical level of four milligrams per liter it is posing threats to bio-diversity in and around the rivers (**Map-9.1**).

Generally, discharge of untreated industrial effluent, urban wastewater, agrochemicals, sewage water, storm runoff, solid waste dumping, oil spillage, sedimentation and also encroachment are major reasons responsible for pollution of Dhaka's watershed. Industrial effluent discharged from Hazaribagh, DEPZ, Gazipur and Savar, and the domestic sewerage from a large part of Dhaka city through storm drain outlets are responsible for pollution of Buriganga-Turag-Bangshi-Dhaleshwari river system.

Besides, people living on the river banks throw their household wastes into the rivers. In consequence, the rivers have become a dumping ground of all kinds of solid, liquid and other chemical wastes.

Encroachment of watershed areas is a common practice resulting in high trend of degrading of wetlands. The tendency of encroachment increases when the demand for land rises leading to rise in land price. Most of the natural drainages of Dhaka City disappeared or on verge of disappearance due to illegal encroachment. Encroachment on the rivers through unauthorized construction and dumping of solid waste is a source of river water pollution



Map-9.1: River Water Quality Map around Dhaka

9.3.4 Air Quality

Air quality of Dhaka is a major environmental concern, especially during the dry season (November-March) when the density of airborne particulate matter (PM) reaches 463 micrograms per cubic meter (mcm). During December-March the density of airborne particulate matter (PM) remains the highest.

The most important pollutants are Carbon monoxide (CO), Sulfur dioxide (SO₂), Nitrogen oxides (NO_x), Ozone (O₃), Hydrocarbons (HC), Suspended Particulate Matter (SPM) and Lead (Pb) that are mainly generated from fuel burning at high temperatures, motor vehicle emissions, chemical reactions in the atmosphere, combustion during industrial processes, transportation of vehicles and biomass burning, various kinds of vehicles, brickfields, constructions, tanneries, navigation, corrosion of metallic parts, soil dusts.

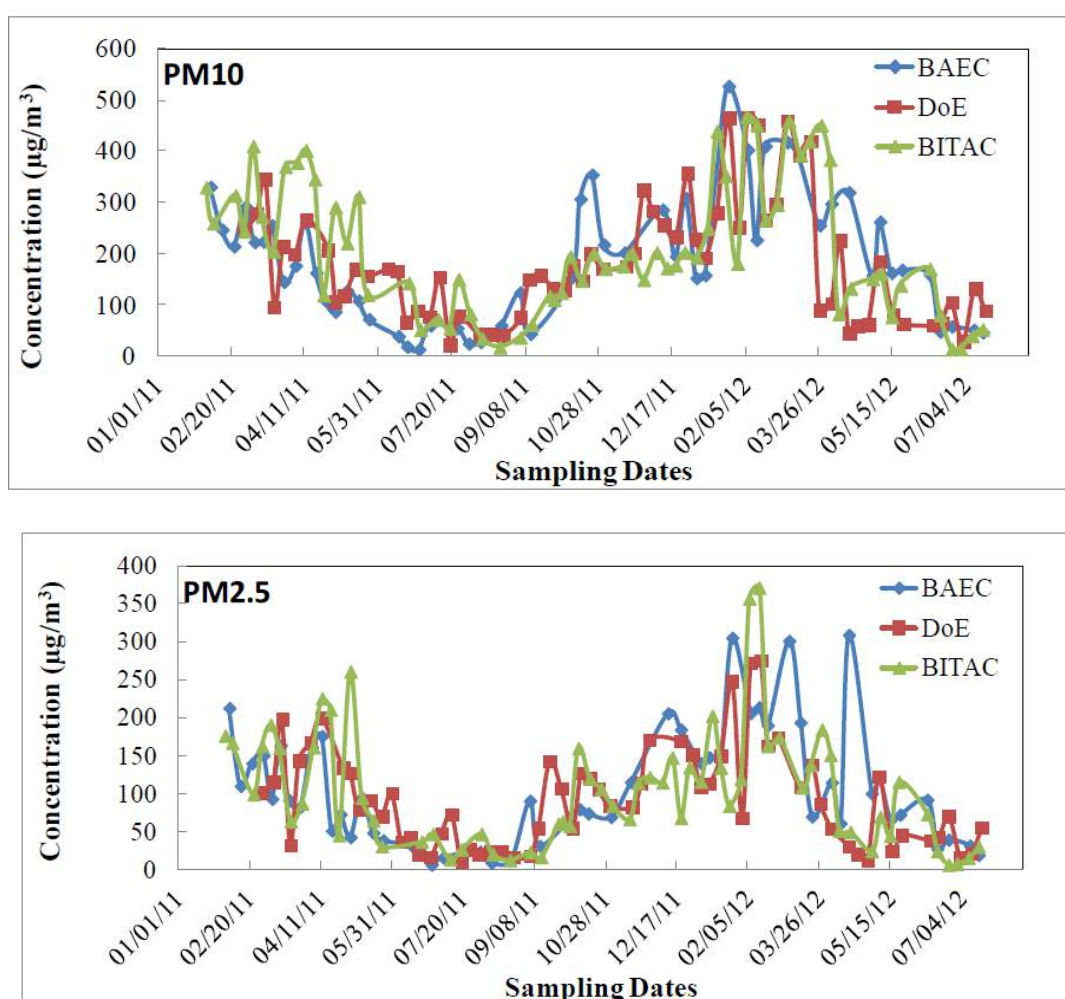


Figure-9.1: Time series plot of PM₁₀ and PM_{2.5} concentration at three sites

The results from continuous monitoring of the air quality obtained from the AQMP project indicate that PM₁₀ and PM_{2.5} levels are considerably above standards, especially in dry season, and they also show an increasing trend. Studies have revealed that motor vehicles, re-suspended dust, biomass burning (in brick kilns and by low income groups as fuels), and fugitive emissions are major contributors to PM₁₀, transport is the major source of PM_{2.5}. Unplanned development and setting of air polluting industries adjoining the residential area and location of the brick kilns adjacent to the DMDP area have aggravated the situation.

It is reported that up to 10% of respiratory infections and diseases in Bangladesh are attributable to urban air pollution (CES, 2006, WB). The problem has been found most severe in Dhaka, where air quality is the worst.

As reported by Air Quality Management Project (AQMP), an estimated 15,000 premature deaths, as well as several million cases of pulmonary, respiratory and neurological illnesses are attributed to poor air quality in Dhaka.

9.3.5 Noise Level

As reported by WHO at 45 locations of Dhaka City, most of the traffic points and many of the industrial, residential, commercial, silent and mixed areas, suffer from noises exceeding the standard limits of Bangladesh. WHO studies found noise levels of 70 dB in Dhaka Medical College, 75 dB in Shakhari Patti, 90 dB in English Road, 88 dB in RAJUK avenue and 85 dB in Tejgaon, though the standard limit for those area are 50, 55, 60, 70 and 75 dB respectively.

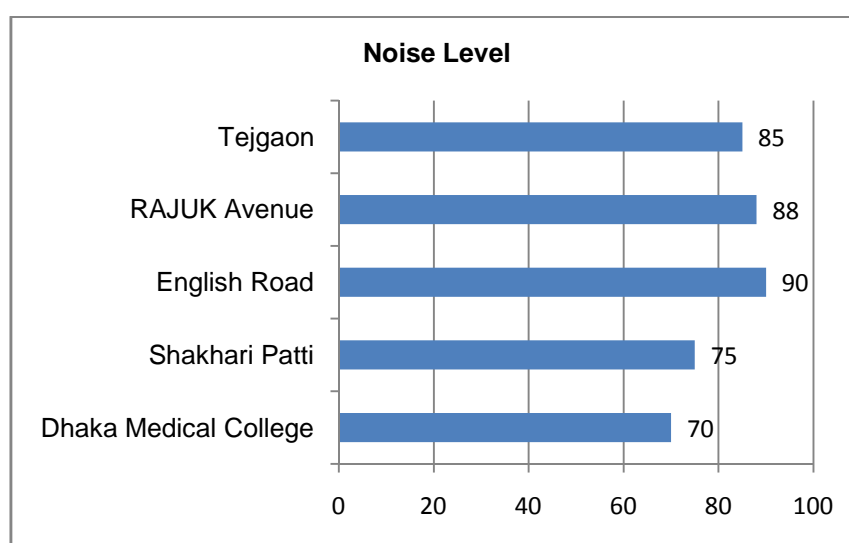


Figure-9.2: Noise Level in dB in Different Areas of Dhaka City

In Dhaka noise problem is severe mainly due to use of loud horn & hydraulic horn in vehicles, loudspeakers from processions and meetings, high volume of audio players from roadside small business enterprises, various activities including gathering of the city dwellers and construction noise. Noise induced from industrial activities and machinery also significantly contributes for noise pollution.

Even the institutions in residential areas, like, schools, hospitals, religious institutions are vulnerable, where noise level is higher than the acceptable limit. Values of different noise parameters are higher in commercial and mixed areas compared to those in residential areas.

9.3.6 Soil Contamination

Dhaka experienced major growth in population, industrialization and commercial activities in the last few decades. At present, there are over 3000 industrial installations within the main city area and over 7000 in Dhaka watershed. Over the last 10 years, major industrialization in and around Dhaka has been observed mainly dyeing, washing and garment textiles.

Soil polluting by industries is a threat to long-term environmental degradation and health risks. Soil contamination by organic and heavy metals and the associated environmental hazards are mostly

being neglected. However, Hazaribagh tannery area has received significant attention in the recent years because of its potential threat to the soil, air, and surface and groundwater quality of Dhaka city and public health. Industrial waste and waste water are usually generated from different industrial processes, as a result the amount and toxicity of waste and waste water released from industrial activities varies with the industrial processes. Again, among all the industrial wastes tannery effluents are ranked as the dangerous pollutants. The direct discharge of wastes from tannery industries has contaminated the ground and surface water with dangerously high concentrations of chromium, as well as cadmium, arsenic, lead, mineral oil and EOX. The contamination of rivers also allows these pollutants to accumulate in common fish and shellfish species, which are used as local food sources.

Tannery industries at Hazaribag, is a major source of pollution of Buriganga. The chromium-laced solid wastes from tanneries are often converted into poultry feed- can thus impact livestock and humans. Contaminated subsoil of Hazaribagh is a serious source of threat of illness to the people living in this area. According to the WHO, over 8,000 workers in the tanneries of Hazaribag suffer from gastrointestinal, dermatological, and other diseases, and 90% of this population dies before the age of 50.

Government has no control and regulation for prevention and usage of contaminated lands. No major investigation done so far to assess the level of land contamination in case of other polluting industrial clusters. High demand for land for development has created pressure for the need to redevelop the contaminated land areas. Rules and special regulations in controlling the usage of contaminated land need to be framed based on suitable standard procedures and technologies.

Other sources of soil contamination are discharge from dyeing factories who use toxic chemical for dyeing cloths. In absence of ETP all pollutants from these factories are discharged into the surface water channels. In suburban areas these polluted water is used by the farmers for irrigation their farm lands and in this way toxic pollutants penetrates into the food chain through food grains.

9.3.7 Environmentally Sensitive Area (ESA)

Environmentally Sensitive Areas (ESAs) are the areas that need special attention or consideration. In Dhaka, ESAs comprise of Ecologically Critical Areas (ECA) and Protected Areas (PA). There are no protected areas, such as wildlife sanctuaries and game reserves, but there are some environmentally sensitive areas within the project areas. Ecologically Critical Areas includes National Park, Gulshan-Banani-Baridhara Lake, and major rivers like Buriganga, Turag, Balu and Shitalakhya etc.

Table-9.2: Wetlands in Dhaka and its surrounding area

Wetland Types
Major retention areas-Dhanmondi lake, Ramna lake, Crescent lake, Gulshan lake, Hatir Jheel
Rivers around Dhaka City(Turag, Buriganga, Bangshi, Balu, Shitalakhya)
Major khals of Dhaka Metropolitan Region

The surface water area of core Dhaka city is about 8% of total land area (RDP Survey, 2013). The rivers, low-lying areas, canals, lakes and ponds of Dhaka city act as retention basins and perform important drainage function.

In September 2009, the four rivers around the capital city Dhaka - Buriganga River, Shitalakhya River, Turag River and Balu River—were declared as ECAs by the Department of Environment and recommended to protect them from encroachment as well as conservation of their biodiversity. In

2001, Gulshan-Baridhara-Banani Lake area was declared as ecologically critical area. Now to save its canals and wetlands from encroachment, the Gulshan-Baridhara-Banani Lake Development project is being implemented by RAJUK.

The nearest protected area is the Bhawal National Park, where a national park was established in 1974. The area is actually honeycombed with habitations and rice fields. The topography is characterized by low hills, rising 3-4.5 m above the surrounding paddy fields, locally known as chalas, and intersected by numerous depressions. The dominant forest trees of the park, Shaal (*Shorea robusta*), have been almost completely removed, but now protection programs have planted Shaal, which covers 90% of the area. No impacts are envisaged on the forest and protected areas due to the proposed project interventions. Government has recently created Bangabandhu Safari Park in Bhawal forest area.

It is estimated that there are nearly 41-46 parks/gardens in Dhaka city (**Map-10.2**) of which Osmani Uddyan, Bahadur Shah Park, Botanical Garden, Zia Uddyan (Garden), Baldha Garden, Suhrawardi Uddyan, Ramna Park etc. are mentionable. All these spaces are protected open spaces and gardens that should continue with care.

9.4 Critical Issues

a. Preparedness for Climate Change Impacts

Climate change is affecting Dhaka primarily in two ways: through floods/drainage congestion and heat stress. The water-logging and drainage congestion due to floods and excessive rainfall during the monsoon are already causing very serious damage. Furthermore, Dhaka also faces “heat island” problems because of increased temperature in the city compared to the surrounding areas.

b. Urban Invasion into the Environmentally Sensitive Areas (ESA)

Due to the lack of guidelines, the impact of development on environmentally sensitive areas has not been given adequate attention, leading to degradation of the natural environment. Encroachment and filling of rivers, canals and lakes is a great threat for future environmental condition. If dumping of domestic and industrial wastes into canals continues, not only there will be an ecological disaster but also the residents will be exposed to great health hazard.

c. Ineffective Management of Hazardous Waste

Management of hazardous waste is gradually becoming a threat to human health considering its long term impacts. The most adverse of them are that they can be introduced into the food chain through cultivation on contaminated land, and their impact on indigenous species. For instance, due to inefficient waste management, using inferior technologies and limited facilities for treating industrial wastes, situation in Hazaribagh tannery area is aggravating day by day.

d. Critical Levels of Air Pollution

The environmental impacts arising from air pollution are increasing with the rapid growth of the city, intense industrial activity, huge population and increased motor vehicle. The major sources of air pollution in Dhaka are vehicular emission, small industries like brick kilns and re-suspended road dust. The vehicular air pollution and brick making accounts for about 40 percent of Dhaka’s fine-particle air pollution. The deterioration of air quality can be a serious hazard to human health leading to pulmonary, respiratory and neurological illness as well as a reduction in visibility.

e. Health Hazards Incurring from Surface Water Pollution

People living near the rivers and are often forced to use polluted river water unaware of the health

risks. This causes spread of water borne diseases. The farmers using polluted water for irrigation are allowing toxic pollutants to enter into the food chain making human health more vulnerable. Solid waste and different effluents dumped into the rivers make it difficult for fishes and other sub-aquatic organisms to survive. Moreover, due to river encroachment and dumping of solid waste, the canals and rivers are losing their natural flow.

f. Exposure to Excessive Noise Pollution

Noise pollution is adversely affecting the environment of this city and causing physical and psychological problems, and thus become an alarming health problem as it exceeds the tolerance level. Noise scenario, in fact, shows a threat to human health, especially for elderly people and children. Moreover, the traffic personnel, rickshaw pullers, open vehicle drivers, road side workers, small scale business enterprise workers are exposed for long-term noise pollution which might cause severe mental and physical health problems. Development guidelines do not stipulate adequate buffer zones between residential areas and potential pollution sources. In some cases, highways and major roads cut through densely populated residential areas. Attention should be given to reduce contribution from sources to reduce noise level.

9.5 Future Plan and Direction

9.5.1 Goal

PROTECTING THE NATURAL ELEMENTS FOR HUMAN HEALTH AND ECOLOGICAL HARMONY

This goal has been set to minimizing threats, for example, through reducing the concentration of dangerous pollutants in soil, air and water, and by limiting urban invasion into areas like environmentally sensitive areas and conservation areas that are significant for environmental sustainability.

9.5.2 Objective and Policy

OBJECTIVE ENV 01: TO REDUCE THE LEVEL OF ENVIRONMENTAL POLLUTION

To ensure healthy living in urban areas the level of environmental pollution need to be kept at minimum level.

Policy ENV1.1: Reduce the Level of Green House Gas (GHG) Emission

- **Strategic Action:**
 - Enforce prevailing rules, regulations and laws effectively.
- **Implementation Tools:**
 - Execute greenery development proposals of DAP.
 - Promote use of energy efficient transport.
 - Encourage using of environment friendly cooking fuel like biogas.
 - Discourage use of coal in brick kilns.
 - Set up a well-designed monitoring system to evaluate environmental pollution.
 - Develop participatory local level environmental monitoring systems by involving local trained people such as school teachers, communities and academic researchers.
- **Implementing Agency:** Local Government Agencies, RAJUK, and DoE.

Policy ENV1.2: Ensure Discharge of Waste Water to Water Channel at Recommended Quality

Ensure that waste water is treated at environmentally acceptable level before discharging into the open water channel.

- **Strategic Action:**

- Take up programme to set up waste water treatment plants to free water channels from contamination.

- **Implementation Tools:**

- Effluent treatment plants will have to be set up through a comprehensive programme to reduce pollution created by industrial discharges;
- Ensure that industries are developed in clustered way so that common ETP can be provided at low per unit cost.
- Be stricter in enforcement of environmental clearance conditions and effluent standards.
- Greater regulatory and societal pressure will stimulate demand for waste minimization initiative.

- **Implementing Agency:** RAJUK, DWASA, Local Governments Agencies, Cantonment Board, DOE, BWDB, DPHE, BEZA, BEPZA, and BGEMA.

Policy ENV1.3: Keep the Level of Air Pollution at Acceptable Level

Like any highly urbanized city, emission from motor vehicles in Dhaka City Region is a significant source of air pollution. Vehicular emission contributes to ambient concentrations of different pollutants. Road traffic, brick kiln and smoke emitting industries have direct effect on air pollution. It is necessary to keep the level of pollution as low as possible so that it does not affect human health. It is also necessary to keep the productive ability of the city dwellers ongoing.

- **Strategic Action:**

- Adoption of preventive measures to keep the air pollution at accepted level.
- Ensure prevention, monitoring, enforcement and education strategy in the management of air pollution.
- Maintain the Pollutant Standards Index for ambient air within the 'moderate to good' range for the coming year;

- **Implementation Tools:**

- Introduce and promote mass rapid transit to control or reduction the number of motor vehicles in the road and reduce vehicle emission (**See Policy-TRANS/2.1 in Chapter 05**).
- As green vehicles (Natural Gas Vehicles, Hybrid Vehicles, Electric Vehicles, Liquefied Petroleum Gas Vehicles, Fuel Cell Vehicles.) are less pollutive than conventional petrol-and diesel-driven vehicles, steps will have to be taken to encourage the use of such vehicles;
- Mandatory provision of prevention, monitoring, enforcement and education strategy in all kind of development process especially pollution generating activities in the management of air pollution of Dhaka City Region;
- Displaying of area wise daily Air Quality Index (AQI) may be launched, to provide and monitor real time information about pollution levels (**See sample Pollution Chart below**).
- Require all in-use vehicles to undergo mandatory periodic inspection and pass the smoke emission test;
- Air pollution measures in acts and regulations should be strictly enforced.
- Encourage more projects on renewable energy, such as solar and biomass;
- Promote use of cleaner energy such as natural gas;
- Pave and clean roads to reduce suspended particulate materials.
- Educate vehicle owners on proper vehicle maintenance to prevent smoke emission;
- Greater awareness and a sense of ownership of the environment by the public will lead to less pollution and reduce the need for enforcement.

- **Implementing Agency:** DTCA, BRTA, DOE, and Local Government Agencies.

POLLUTION CHART

Air Quality Index on May 11, 2015 at 4 pm (Average of past 24 hours)

S.N	Area	Air Quality	Index Value	Prominent Pollutant
01	Dhaka	Severe	463	PM 2.5, PM10
02	Gazipur	Moderate	135	PM 10
03	Narayanganj	Very Poor	305	PM 2.5
04	Savar	Very Poor	310	PM 2.5
05	Rupganj	Moderate	147	PM 2.5
06	Kaliganj	Satisfactory	82	CO
07	Keraniganj	Satisfactory	75	Ozone (O ₃)
08	Sonargaon	Satisfactory	85	PM 2.5

Source: Compiled by Consultants

Policy ENV1.4: Minimize Household Exposure to Unacceptable Noise Level

RAJUK and local governments must coordinate strategies to ensure land use compatibility in the planning processes to prevent generation of new noise sources, or noise-based land use conflicts that have an adverse impact on public health and amenity.

- **Strategic Action:**

- Avoid noise-based land use conflict through comprehensive planning and the development assessment processes

- **Implementation Tools:**

- Ensure that potential land use conflicts are avoided early by providing appropriate separations for incompatible land uses;
- Residential and other sensitive developments should be located and designed to minimize noise impacts on residents while recognizing the benefits of focusing housing around transport nodes or rail corridors;
- Educational institutes and Hospitals would be provided with a green buffer zone to create noise preventive healthy environment;
- To get rid of airport noise pollution alternative location should be searched for relocating Hazrat Shahjalal (R:) International airport as it is fast coming in the heart of the city;
- Use of closed generators and fit efficient muffling and sound absorbing devices to reduce sound level;
- Strictly enforce the ban of using hydraulic horns;

- **Implementing Agency:** RAJUK, Local Governments Agencies, BRTA, RHD, DMP, and DoE

Policy ENV1.5: Relocate Hazardous/Noxious Industries

Noxious industries are very critical sources of pollution that can affect human health. Therefore, they have been marked as red type of industries. These industries should be located at a safer place away from human habitation to ensure safer living.

- **Strategic Action**

- Treat hazardous and noxious industries with care in all city plans.

- **Implementation Tools**

- Designate space for hazardous and noxious industries (Please see **Map-7.2**).

- Ensure ETP for toxic liquid waste treatment.
- Arrange relocation of existing noxious industries from or near human habitation.
- Remove all hazardous chemical storages from or near human habitation to safer places. Use punitive measures against defaulters.
- **Implementing Agency:** RAJUK, Local Government Agencies, DoE, BEZA, BEPZA, and Ministry of Industries.

Policy ENV1.6: Improving Public Health

The focus of a public health intervention is to prevent and manage diseases, injuries and other health conditions through surveillance of cases and the promotion of healthy behaviors, communities and environments. Many diseases are preventable through simple, non-medical methods. For example, research has shown that the simple act of hand washing with soap can prevent many contagious diseases. Public health challenges are no longer just local, national or regional. They are global. They are no longer just within the domain of public health specialists. They are among the key challenges to our societies.

- **Strategic Action:**
 - Increase community ownership to sustain a high standard of public health.
 - Maintain low incidence of vector-borne and food borne diseases.
- **Implementation Tools:**
 - Regular survey and research to create a healthy indoor environment;
 - Diagnose, investigate, and monitor health problems and health hazards of the community
 - Improve vector control methods and understand vector behavior through research and development (R&D).
 - Improve cleanliness and hygiene of public places;
- **Implementing Agency:** DPHE, DoE, and Local Governments Agencies.

Policy ENV1.7: Take Effective Measures to Prevent Soil Contamination

Tanneries in Hazaribagh are not only polluting local residential environment but also the surrounding waterbodies including the Buriganga River. Toxic pollutants discharged from dying factories into the nearby khals and rivers are polluting the water. When this water is used by farmers for irrigation the pollutants enter the food chain and affects human health.

- **Strategic Action:**
 - Expedite the process of shifting tanneries from Hazaribagh to Savar Tannery Estate. Use of ETP by polluting industries.
- **Implementation Tools :**
 - Expedite the relocation of the Hazaribag tannery industrial complex to Savar, and prepare redevelopment plan of the previous site for use by environmentally-friendly activities(**See BOX-4.4 of Chapter 04**);
 - All water polluting industries should be monitored by DoE. Punitive measures may be taken against defaulters.
- **Implementing Agency:** Ministry of Industries, DoE, and Local Governments Agencies.

Policy ENV1.8: Creation of Environmental Awareness among People

It is necessary that community people from all level should be encouraged to take part in taking care of the environment. Environmental protection can best be achieved by means of making people aware of the consequences of environmental degradation.

- **Strategic Action:**
 - Publicity drive by DoE and relevant NGOs.
- **Implementation Tools:**
 - Publicity actions in the form of seminar, workshop, TV advertisement, newspaper supplement, drama, at the individual as well as household and community level should be undertaken for reducing resource consumption and waste production, cleaning up the urban environment and organizing information sharing campaigns would better protect the environment around Dhaka
 - Provide public information to raise awareness of the causes and impacts of environmental degradation.
 - Encouraging debate on environmental priorities and strategies, e.g. through workshops involving experts and people would produce a people centric action plan.
 - Environmental awareness programmes may be undertaken by all public sector agencies including DoE, RAJUK, City Corporations and Pourashavas.
- **Implementing agency:** DoE, RAJUK, Governments Agencies other related voluntary organizations and NGOs.

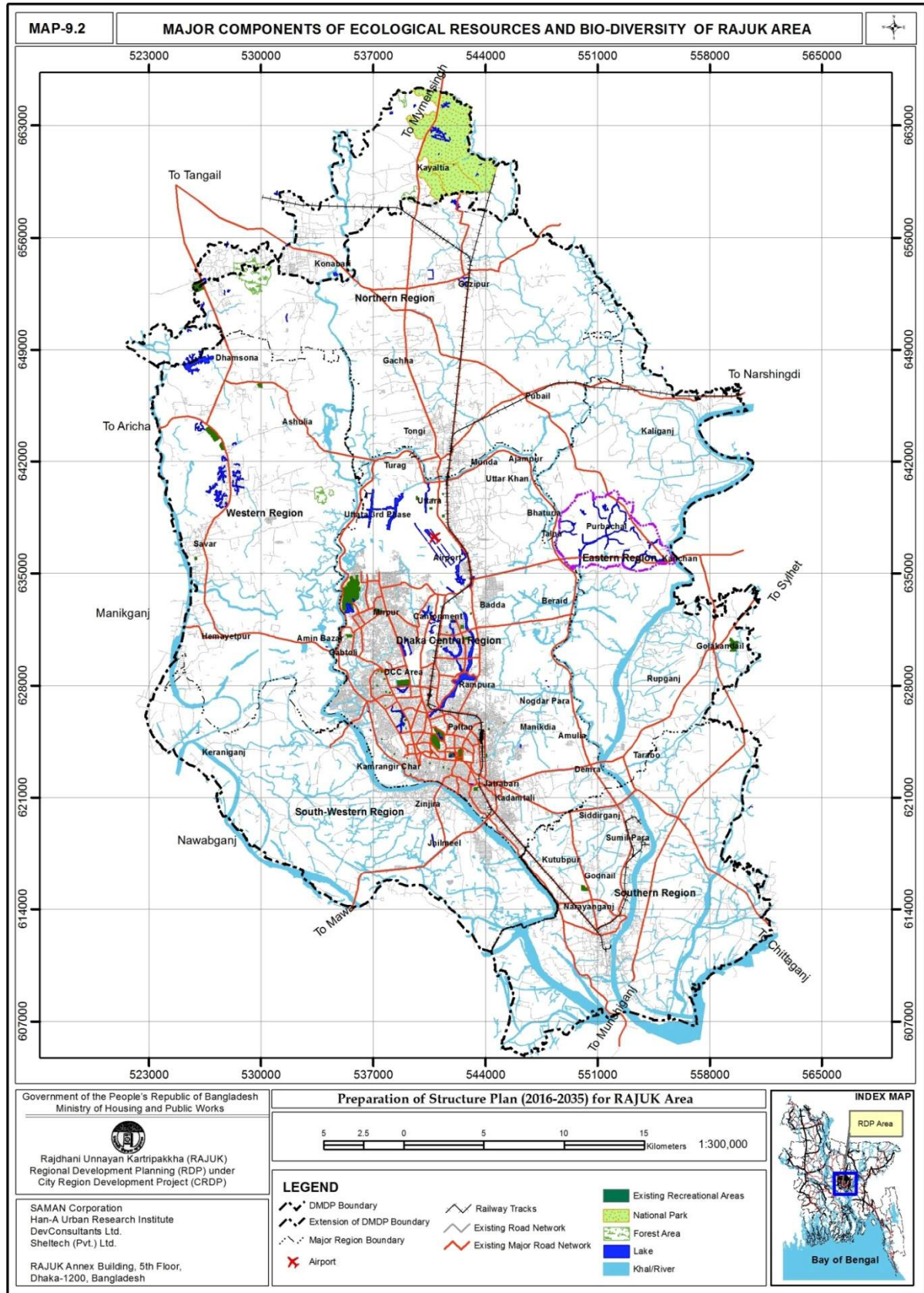
OBJECTIVE ENV 02: TO PROTECT DHAKA'S NATURAL ENVIRONMENT

To avoid compromising the City's natural resources and built heritage, environmentally critical areas designated in the Plan should be properly preserved and documented following policies are recommended. Preservation of environmentally critical areas is necessary to maintain sustainable environment including biodiversity and flood protection.

Policy ENV2.1: Keep the Natural Areas as long Possible

With the twin demands of economic development and "back-to nature" recreational activities putting enormous pressure on our natural environment, the future holds formidable challenges. One of these is the dilemma of competing land use. They must be protected and preserved to ensure a healthy urban living. Failure to conserve natural ecology covering water bodies and traditional flora and fauna will affect ecology and livability in the future Dhaka City.

- **Strategic Action:**
 - Ensure conservation of designated water bodies and traditional flora and fauna.
 - Verify and update information on indigenous flora and fauna through biodiversity surveys.
- **Implementation Tools:**
 - Inclusion of the provision of preserving and maintaining variety and population of flora and fauna in and around the RAJUK in the environmental law.
 - Fix the size of preserveable water bodies in next DAP.
 - Protect and preserve designated Flood Plains (Please see **Map-8.6**);
 - Establish more parks and green linkages.
 - Monitor and update our biodiversity information;
 - Areas which are richest in biodiversity will have to be marked for conservation and research only (Please see **Map-9.2**);;
 - Take stringent measures against violators making use of the prevailing legal provisions.
 - More efforts will also be made to raise public awareness of nature areas by exploring additional communication channels to provide useful information to the public of these areas.
- **Implementing Agency:** RAJUK, DWASA, DoE, BWDB, and LGED.



CHAPTER 10
**PRESERVING OPEN SPACE
FOR RECREATION
AND AESTHETICS**



CHAPTER 10

PRESERVING OPEN SPACE FOR RECREATION AND AESTHETICS

10.1 Introduction

Open space can be defined as un-built lands within the city which provides environmental, social and economic benefits for the communities that cover land and water bodies devoted to recreation, scenic beauty, conservation. In addition to their ecological and aesthetic value to urban dwellers, open spaces are used as recreational facilities either in active or in passive mode. Apart from open space, urban heritage also form an integral part of recreation for domestic and foreign tourists. They are important indicators for livability of towns and cities to ensure health and wellbeing of the citizens. This Chapter of the report deals with open space, covering active and passive recreational open space including green network, urban and peri-urban greening, water bodies and heritage issues as important elements of urban recreation.

10.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of open spaces and the new policies proposed in the Structure Plan.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Lakes and gardens in the core city area. • Presence of large number of heritage buildings and structures of architectural excellence. • Existence of Forest areas, including Bhawal National Forest area; • Scope of riverfront recreational development; • Bhawal Palace and Tombs are elements of tourist attractions; 	<ul style="list-style-type: none"> • Scope to develop recreational open space in suburban areas due to presence of unused and natural landscape. • Open space provision in DAP and Structure Plan. • Dhanmondi and Hatirjheel lake provide very important open space and recreation. Proposed other retention areas and major khal should be developed in similar way to prevent development encroachment and increase the limited open space and recreation areas in the city; • Relocated Central Jail area will provide an opportunity for much needed open space in the Old Dhaka; • Gulshan lake provides excellent opportunity for further development of water based recreational facilities;
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Poor management of formal open space. • Poor measures to protect public open space. • Poor maintenance of heritage structures/sites. • Lose of natural water bodies due to filling and encroachment. • Failure of development agencies and urban local governments to implement plan designated open space provisions. 	<ul style="list-style-type: none"> • Encroachment of public open space. • Indiscriminate developments on the river front. • River pollution. • Historical buildings are gradually deteriorating for lack of proper maintenance and their tourist potential is largely under used; • Development in designated public open space.

10.3 Scenario Analysis

10.3.1 Open Spaces

In the 1990s only 36% of the core Dhaka city area was under urban use and the rest 61% was non-urban or semi-rural, agriculture use (Islam, 1996: 192). RDP survey (2013) reveals 48% of the entire RAJUK area under urban use and 52% non-urban use. Among these only 1142.42 acres (0.30%) of the land is used for recreational activities, which is significantly low (0.07 acre/1000 population) as compared to other major cities and falls far behind DMDP (0.16 acre/1000 population) or DAP (0.96 acre/1000 population) standards.

The situation will be more critical in 2035 where population will become 8.83 million in core area requiring 25.3% of area (ie.135.67 sq.km) to be preserved as open space following DAP standards.

In Dhaka, different agencies are responsible for maintaining the public open spaces. Large scale open spaces under PWD (i.e. Sohrawardi Uddayan and majar area, Ramna Park, Shahid Minar, National Assembly Building, Chandrima Uddayan, Anowara Uddayan, National Eidgah Field) covers 302.5 acres land. Besides, DCC maintains local level parks and play grounds constituting about 85.25 acres. Housing and Settlement Directorate has 5.71 acres. Besides, Mirpur Zoo, Botanical Garden, and National Stadium cover 86.33 acres.

Thus, the existing stock of open space within the Core city is about 480 acres. Besides, a number of open spaces are maintained by different institutions and authorities in and around the city where use is reserved. Due to diversity and complexity of management of all these open spaces the total stock of potential open spaces cannot be identified and calculated from reliable sources.

For such difficulty, maps of Dhaka rarely reflect the real stock of open spaces. Within the RDP area (1,610 sq.km) open spaces under recreational category is 1142.42 acres only, whereas in DAP (1,528 sq.km) open spaces of all category, including vacant and unused land, was 6962.54 acres.

In fact, such anomalies have resulted because of inconsistency in definition and classification of Open Spaces. Different vested groups are taking advantage of such weaknesses of planning process and causing loss of open spaces in due course of time. Therefore, classification of open spaces has to be established and corresponding implementing authorities for respective class needs to be identified.

According to Park, Wetland and Open Spaces Conservation Act 2002, Section (2), open space is defined as a space marked in a master plan as 'open space' or what has been declared as 'open space' by government gazette notification. Such definition is not self-explanatory, rather operational in nature which implies that an open space needs to be identified first by authority and marked as 'Open Space', thereafter approved by gazette notification to be dealt with under this category. As a result, undetermined open spaces are always under threat of land grabbing and total stock remains hidden in disguise. Therefore, it is essential to demarcate the existing stock of open space in a Map for protection and further necessary action.

In DMDP Structure Plan two policies, **POLICY SE/10-AUGMENTING CITY OPEN SPACE** and **POLICY SE/11- SECURING FUTURE OPEN SPACE**, were set to preserve and maintain the stock of open spaces. However, those policies have not been implemented due to their inherent weaknesses - lack of willful effort by the concerned authority and lack of awareness and coordination among the implementing agencies. As a result, the stock of open space is found to be declining to 987.15 acres during the last 20 years. Even so, both of the policies are still pertinent and need to be continued till 2035 with necessary adjustments.

BOX-10.1**CLASSIFYING OPEN SPACE**

Based on primary use character the variety of open spaces in Dhaka can be classified under following subcategories.

- a. **Park** - Within urbanized areas, parks are used purely for the recreational purposes. They are of two categories mainly: city level parks (from 50- 80 acres) for all citizen and local parks (usually less than an acre) for neighborhood people mainly.
- b. **Playgrounds and Sports Facilities** -These are open spaces are assigned for more or less organized out-door sports facilities both at metropolitan level (like stadiums, swimming pools and tennis complex at metropolitan scale), and at community level (like play fields in residential areas, usually 2-9 acres).
- c. **Urban Development Open Space** - These include urban plazas/parks of various sizes in commercial and institutional areas. They are mainly intermediate to small sized green areas with pavements (usually 2- 8 acres). Some of these areas have historic, cultural or political importance. These are not purely recreational areas by nature, but they help to enhance a better urban living condition.
- d. **Functional Open Space** - Some open spaces are very much functional in nature, like Eidgah, nursery, car parks, graveyards and cemeteries, etc.
- e. **Streetscapes, Trails and Buffer** - These are scattered and sporadic open spaces within the city boundary, beyond the functional spaces. Open spaces and plantation along the streets, sidewalks, interchanges and street medians contribute to the green streetscape. Besides, the trails are open space corridors for conservation, recreation and alternative transportation. They are mostly linear in shape that may occur by the rivers, lakes, canals, storm water corridors/drainage channels, utility corridors, abandoned rail lines, right-off-way along major roads, the green belts around ponds, water retention areas or outline of swamps and low land.
- f. **Urban Forests /Natural Park** - Forest areas include national park, botanical garden, urban forest, roadside forestry and orchard garden, etc. These fairly big open areas as picnic spots or naturally pleasant sites in the form of natural parks are developed for recreational purpose at out-skirt of the city.
- g. **Protected Area** - Special areas of scenic and other natural values, like river banks, usually facilitate recreational use of general public.

a. Review of Open Space Standard

City planning practices need some standards of recreational open space to ensure livability. DMDP (1995-2015) standardized 0.16 acres as parks/open space per 1,000 populations which is equivalent to 4 acres of open space as parks as part of community services for 25,000 populations as specified in Urban Area Plan (1995-2005). The DAP proposed the following standards (**Table-10.1**) of open space for recreational use:

Table-10.1: DAP (2010) Proposed Open Space Standards at Neighbourhood Level (for 12,500 People)

No	Name of the Facility	Quantity		Area		
		Min.	Max.	Minimum for Unit Facility	Sub Class Total	Class Total (Acre)
		(No.)	(No.)			
1	Open space			10 Acre		12
	i) Park/children's park	1	2	0.3 Acre	1 Acre	
	ii) Water body/Canal/Pond	As per Planner		1.5 Acre	6 Acre	
	iii) Play field	2	3	1 Acre	3 Acre	
	iv) Green/Vegetation/ Water Front	As per Planner		0.5 Acre	2 Acre	

Source: DAP Reports (2010)

DAP (2010) proposed an optimum standard of 0.96 acre/1,000 population at neighborhood level park and play field as 0.32 acre/1,000. Only B group (DAP) indicated that standard of regional parks and open spaces within DMDP will be 0.28 acres /1000 people. Compared to DAP, the Private Residential Land Development Rules (PRLDR, 2004) has prescribed a lower Standard of Park and Playground (0.2 acres/1,000 populations). Thus DAP standard prescribed 1.6 times bigger open space than PRLDR and 2 to 6 times of DMDP (1995) standard (0.16 acre/1,000 populations). Varying standards among government bodies and agencies make the situation complex. When compared to South Asian cities in contemporary time, DAP proposed only 60% of Kuala Lumpur; 78% of Hong Kong and only 30% of Delhi. It is also important that DMDP, DAP or PLDA only suggested standards for parks and playgrounds at neighborhood level. Whereas, it is very important that large scale parks and open spaces need to be identified and preserved for recreational purpose of the future citizens.

It is revealed from DAP review that the Central area cannot even accommodate the standard with its meager stock of open spaces. In fact, the standards are set in terms of population without considering the urban fabric, its density, availability of open spaces and their optimum distance from home, etc. As a result livability in Dhaka is being endangered. Indeed, city planning needs to address the uniqueness of Dhaka in setting the standards and classification in its own way.

b. Recommendations

In case of Dhaka city, authority needs to consider the open space stock including the non-traditional types of open spaces for recreational purpose - ensuring accessibility to water bodies; creating green network in the core city; enabling use of open spaces outside the city like forests and agriculture land, etc. Moreover, properly arranged spontaneous open spaces other than parks, playgrounds may also substitute. However, open spaces of different categories need to be placed in optimum distance and with desirable size as shown in the figure below.

Hierarchy of Open Space	Facilities	Size [minimum]	Distance from home [optimum]
Metropolitan Park	General amenity area or woodlands with facilities	150 + acres	2-3 miles
District Park	Children's paly, court games, some special facilities	50-75 acres	3/4 mile
Local Park	Children's paly areas, informal games, quite areas	5-10 acres	1/4 mile
'Mini' Park	Sitting area, flower garden, children's play areas	under 2 acres	less than 1/4 mile

Figure: 10.1 Types of Urban Recreational Open Spaces

In developed countries, a standard of 10 acres of open space for every 1,000 residents is often used as a basis for estimating the demand for recreational use in a community. Communities frequently require additional lands to provide for the range of facilities desired by its residents and also to accommodate recreational demands from residents in nearby outlying areas. However, if a 10 acre/1,000population standard is applied in Dhaka, for 26 million people in 2035, the required open space will be 1052 sq.km, which is about 65% of RAJUK area. Such a standard is simply unattainable and overly ambitious.

Considering the prevailing conditions of Dhaka city, any ambitious and unattainable open space standard following western countries cannot be suggested. A requisite standard needs to be adjusted for different zones in Dhaka, like central city (core) or beyond, based on the density of habitation and availability of open spaces. Among them, park, playground at neighborhood level must be ensured in all urban centers including core area for which DAP proposed standard can be a considerable guide. Besides, city scale open spaces need to be demarcated with easy accessibility, especially for people of densely populated areas with meager scope for open space. Following **Table 10.2** suggest a standard of recreational open spaces within RAJUK area that requires 0.86 acre/1,000population, thereby 22,360 acre (90.46 sq.km) for 26 million population which will be 6% of total area.

Table 10.2 Open Space Standard for DMDP Area for Each 1000 People

No.	Name of the Facility	Standard	Size of unit facility
1	Open space	acres / population	acres
	i) Park/children's park (local park/ mini park within neighbourhood)	1.5 acre/ 12,500 i.e. 0.12 acres/1,000	Under 2 acres & avg. 0.25 acre
	ii) Play field (local play area)	3 acre/ 12,500 i.e.0.24 acre/1,000	3-10 acres
	iii) District Park (within city, intermediate scale)	25 acre /100,000 i.e. 0.25 acres /1,000	50-75 acres
	iv) Metro Park (urban forests/ natural parks out city or on edge, large scale)	25 acre /100,000 i.e. 0. 25 acres /1,000	150 + acres
	Total	0. 86 acres /1,000	

10.3.2 Heritage Sites

Heritage sites and structures include all the historic areas, buildings, monuments or other features or buildings and structures of recognized architectural significance which contribute to the cultural, social, economic, political, artistic or architectural significance. Recognizing the area's unique character these are needed to conserved and preserved to retain the area's historic resources and properties. Built heritage needs to be protected, nourished and nurtured by all citizens and passed on to the coming generations. Appropriate action plans may be prepared by all the concerned agencies for promotion of conservation of the civic and urban heritage, architecturally significant historical landmarks, living monuments, memorials and historical gardens, riverfront, city wall, gates, bridges, vistas, public places, edicts and the ridge. Listing of heritage buildings based on the following criteria:

- The age of the building. Its special value for architectural or cultural. Justifications or historical periods.
- Its relevance to history, its association with a well-known character or event.
- Its value as part of a group of buildings.
- The uniqueness of the building or any object or structure fixed to the building or forming part of the land and comprised within the cartilage of the building.



Figure-10.2: Heritage Sites and Historic Buildings in Dhaka

Government has already prepared an inventory of 'listed' Buildings and Heritage Sites within Dhaka City through a Gazette notification (2009) where, 93 buildings and 4 areas (Farashganj, Shankhari Bazaar, Sutrapur and Ramna) of the city are included that need to be conserved. Besides, DAP had identified preservation overlay sites in RAJUK area, indicating that the places that are historically important as fort or historic buildings that will not be demolished and will remain as 'Historic Preservation Overlay Sites'. DAP recommendations also ensure that buildings, structures or signs shall be erected, reconstructed, altered or restored so as to be architecturally compatible with the historic landmark buildings or structures within the zone. All these inventories, listing, and recommendations etc. will be supported within RDP framework.

10.4 Critical Issues

a. Encroachment of Public Open Space

The primary threat to the stock of public open space comes from the encroachment both by public and private bodies. The government agencies themselves have completely or partly swallowed a number of parks and open spaces in Dhaka either by constructing community centers, government offices, etc. or by allotting plots for residential purposes. In this way, the small and intermediate sized open spaces/parks are in danger of encroachment.

Even, the large scale parks or open spaces are also being threatened with encroachment. Large scale public projects are being placed in the available precious open spaces in Dhaka. Like the Memorial and under-ground museum at Sohrawardy Uddayan, International Conference Center towards the north of Chandrima Uddayan, Tennis Complex in Ramna Park, etc. Side by side, private owners are also taking the adjacent open spaces illegally. Such cases are found near Dhanmondi Lake, and Gulshan Lake.

Some of the areas designated as retention ponds and drainage channels in the flood protection schemes are also being filled up by real-estate developers. In addition, vast areas along rail lines, vacant lands and low lying areas of Dhaka are being illegally occupied by slums and squatters.

b. Ignoring the Plan Directives

Some large scale open spaces in Dhaka are under forced occupation by government and semi-government bodies in spite of clear planning directive in DMAP and DAP for recreational use. Among them the important areas are **Old Airport** area, BGB (BDR) area and central jail area, which are occupied by respective ministries.

Current facilities in **Old Airport** need to be removed and to be used for civic facility, like parade ground for national ceremonial functions and lakes, parks and green open space. Similarly, the central jail, when shifted, will make available opportunity for much needed open space and other supporting public services including parks, playground and recreation area.

c. Incompatible Standards and Absence of Classification

Standards of open space required as community facilities are set differently by various government agencies in Dhaka. Again those standards are inconsistent as well as extremely low from relevant standards in similar countries. Besides, no standard is maintained in classifying different types of open spaces. Thus, there exists a total chaos in this sector resulting into constant loose of open spaces.

d. Poor Management of Formal Open Space

Physical quality of open spaces is very poor in Dhaka. The existing parks and play grounds are not properly maintained by authority. Although the country is very much green, much of the open spaces are found barren and repulsive. The contribution of open space, as a physical element, focuses on three criteria: **quantity, quality and accessibility**. But most of the open spaces in Dhaka do not fulfill all the three criteria.

e. New Urban Open Space

In view of such shortage in core area, DAP has proposed to acquire 1590.6 acres of open spaces, which are to be kept open for future use, from public organizations and some from private landowners. (Table-9.2) Although the process incurring in this adventure is not simple in the present context of Dhaka, it is important to note that this will attain almost 6% of core city area (Group-C area 26224.55 acres) for recreational purpose. Water bodies and lakes are also included to turn into recreational areas considering their scenic beauty and shortage of open space in reality. However, for each of the following scheme a detail master plan of physical layout of recreational and community uses needs to be prepared.

f. Scattered Unconnected Green and Blue Resources

Green areas inside the city remain as scattered and disintegrated elements with negligible contribution to environmental quality and ecological balance

g. Lack of Preservation Efforts for Historic Sites and Buildings

Field observation reveals a pity scenario of the artifacts, historic and heritage sites. At many sites the DAP recommended instructions have been ignored or violated. Many historic sites are in deplorable condition with nobody to take care of. Unwanted and incompatible land uses are being developed around historical sites endangering the very existence of the sites. These are serious threats to heritages in RDP area. In compliance to existing Acts/ Rules for Archeology and Heritage Conservation, significant areas and particular buildings within RAJUK area need to be preserved considering their historic and cultural value. Archeological sites need to be protected as per existing acts, laws etc and planned integration of the sites with the surrounding are urgently needed.

10.5 Future Plan and Direction

10.5.1 Goal

Regarding open space and heritage present Structure Plan aims to attain the following goal.

ENHANCING LIVABILITY THROUGH PROMOTION OF OPEN SPACE AND HERITAGE

The following objectives and policies under various issues of open space and heritage have been set to achieve the above goal.

10.5.2 Objective and Policy

OBJECTIVE-OS 01: TO PROMOTE QUALITY OF LIFE THROUGH ENHANCING OPEN SPACE

In core Dhaka city available open space are in vulnerable state due to illegal encroachment and mismanagement. In a very high density city like Dhaka, open spaces serve as life blood for urban living. They must be preserved to improve quality of life of the millions of urban dwellers desperate for leisure to get rid of everyday monotony.

Policy-OS/1.1: Protect and Preserve Available Recognized Open Space

Mismanagement and lack of maintenance is rendering the available recognized open space non-usable and reducing the supply of open space. Shortage of open space is likely to become a source of health and social problems in future.

- **Strategic Action:**
 - Protection and maintenance of recognized open space.
- **Implementation Tools:**
 - RAJUK should immediately embark on making inventory of available open including those under city Corporations and Pourashavas, space within its jurisdiction.
 - Prevent encroachment and forced occupation of public open space.
 - It should advise concerned controlling agencies to take appropriate measures to protect and preserve their respective open spaces.
 - Visit, monitor and report condition of open space every six month.
 - Ensure quality and accessibility of parks and greeneries.
- **Implementing Agency:** RAJUK, City Corporations and Municipalities.

Policy-OS/1.2: Mark and Develop Future Open Space in Advance in Proposed Urban Areas

Open space facilities will make urban areas and urban centers more attractive to their dwellers. Securing open space land in advance in new growth promotion areas is needed before land becomes scarce and expensive caused by high demand due to increasing population.

- **Strategic Action:**
 - Acquire marked (Structure Plan and DAP) open space provisions in sub-urban and growth promotion areas, Pleases see **Map-10.3**.
- **Implementation Tools:**
 - RAJUK, City Corporations and Poursahavas in their DAP and Action Plans should earmark potential lands as open space for future use.
 - Central Jail area will developed as a major recreational hub of Old Dhaka City area;
 - **Old Airport** site will be developed as Dhaka's Central Park (**Dhaka Square**) and the central location of this area will be made ideal site for a new National Sporting complex. Sporting complex would be capable of hosting, in one location, such regional and international events as the South Asian Association of Regional Confederation (SAARC) and Commonwealth Games;

- Large khas land could be developed as recreational space.
 - Develop Jimkhana area of Narayanganj as major recreational hub of Southern Region. This area can be developed as per the **Vision Master Plan** of Narayanganj City Corporation;
 - Necessary measures should be taken to secure the lands through compulsory acquisition of private land wherever necessary.
 - Develop internationally standard stadium both in Northern and Western Region of RJAUK area;
 - Bhawal National Park Area would be developed as special recreational hub to attract more tourists;
 - Develop proposed Water Retention areas as major recreational hub like existing Hatirhjeel lake;
 - Develop and preserve existing waterbodies of Baunia of Mirpur right portion of Cantonment to Kalshi (Matikata) road as major recreational hub like Hatirhjeel lake;
 - All designated forest areas would be preserved and developed as recreational area;
 - Secure green and open spaces through either 'Pre-emption (priority purchase right by government)' or enacting 'green plot ratio' concept in the building regulation.
 - Development of urban riverfront at Buckland Bund from Farashganj-Ruplal House to Ahsan Manjil-Badamtali Ghat as recreational corridor;
 - Securing access for public to some of the City's vastly under-utilized Government and institutional land holding, for passive recreational use, on the successful model of Chandrima Uddayan.
- **Implementing Agency:** RAJUK, NHA, City Corporations, Pourashavas, PWD, Deputy Commissioner, Dhaka, Narayanganj and Gazipur Zila.

OBJECTIVE-OS 02: TO CREATE URBAN LINKAGE THROUGH OPEN SPACE [HUMAN MOVEMENT]

A Green Network will have to be delineated to protect, expand, and connect green areas and other environmentally sensitive areas within RAJUK boundary. This will help to provide breathing space and promote ecological balance, preserve bio-diversity and promote wild life.

Policy-OS/1.3: Create Green Network within RAJUK Area

The greenway network would, among other things, democratize healthy outdoor recreation activities and access to nature by creating a network of linear parks, landscaped streets, and boulevards across the city, using mostly existing city streets and public rights-of-way.

- **Strategic Action:**
 - Incorporation of the proposal in DAP and Action Plans.
 - Green Network' can be developed centering the Old Airport site turning it into the central green park of Dhaka.
- **Implementation Tools:**
 - Link neighborhoods with few parks to the city's major parks, lakes and to the riverfront.
 - Connect greenway network to transit network;
 - Link major isolated parks to one another.
 - RAJUK should negotiate with concerned agencies to reserve their green and vacant areas as part of the green network.
 - Project preparation, budget allocation and implementation.
- **Implementing Agency:** RAJUK, City Corporations, Pourashavas, PWD and various other government agencies having large land areas in Dhaka.

OBJECTIVE-OS 03: TO CONSERVE WATERBODIES AS SOURCES OF AESTHETICS AND RECREATION

Water-bodies are resources in urban areas. Without proper action they disappear fast amid rising land prices. If sizable water-bodies can be preserved they can add to local aesthetics and become sources of recreation for all.

Policy-OS/3.1: Conserve all Conservable Water-bodies to Enhance Local Aesthetics and Make them Sources of Recreation

- **Strategic Action:**
 - Inventory and delineation of all local conservable water-bodies in Plans.
- **Implementation Tools:**
 - Inventory and delineation of all conservable water-bodies in the DAP and Action Plans.
 - Preparation of development project and allocation of budget.
 - Design water-bodies with landscape and green belt, sitting arrangement, walkways.
 - Preserve green belts on both sides of conservable waterbodies.
- **Implementing Agency:** RAJUK, City Corporation, Pourashava, PWD, LGED, Ministry of Land.

Policy-OS/3.2: Involve Community to Integrate the Water Bodies with the City Fabric

- **Strategic Action:**
 - Interaction and motivation of private water-body owners and users on the benefits of preserving water-body.
- **Implementation Tools:**
 - Publicity and motivational drive through talk show, seminar.
 - Discussion and motivation of water-body owners.
 - Allow existing land owners to make economic use their water bodies through fish culture, recreational use and other permitted uses as described in plans.
- **Implementing Agency:** RAJUK

OBJECTIVE-OS 04: TO ENCOURAGE URBAN AND PERI- URBAN FORESTRY AND GREENING

It is strongly proposed to re-create urban forest through protection and preservation of vegetation and wetlands in and around the city. They are essential for environmental and biodiversity benefits, economic and livelihood benefits, and social and cultural benefits beyond recreational use and aesthetics.

Policy-OS/4.1: Establish Urban and Peri-Urban Forestry and Greenery

Establish the concept of Urban Forestry and Greening (UPFG) beyond the core city to maintain biodiversity and ecological balance and help reduce global warming.

- **Strategic Action:**
 - Delineate all previous forest land under the Forest Department within RAJUK area as forest.
- **Implementation Tools:**
 - Mark all previous forest lands under the Forest Department in the DAP land use plan as forest.
 - Develop an urban forest project, allocate budget and execute the project in collaboration with forest department.
- **Implementing Agency:** RAJUK, City Corporations, Pourashavas, LGED, & Department of Forest.

OBJECTIVE-OS 05: TO PRESERVE ANTIQUITIES AND MONUMENTS

Antiquities and monuments are the identities and prides of a nation that present their culture and heritage. To keep alive the cultural and historical past of the nation and pass them to the coming generations all the heritages should be preserved and carefully maintained. They are also attractions to the local and foreign tourists.

Policy-OS/5.1: Prepare Framework Plan and Urban Design Scheme for Heritage.

Framework plan will help draw up the line of action to preserve heritages.

- **Strategic Action:**
 - Initiative by RAJUK to prepare framework plan and urban design scheme for heritages
- **Implementation Tools:**
 - Develop Panam City and Panam Nagar of Sonargaon and langalbandh of Narayanganj as part of a national tourism master plan;
 - Develop framework plans and urban design schemes for selected archeological sites, heritage sites and the premises of listed buildings ensuring public use and accessibility.
 - Any kind of development within a radius of 250 meters from any such Gazetted Heritage sites and structure must be subjected to Special Project Permit from the relevant committee;
 - For the promotion of tourism, Hajiganj Fort and its adjacent areas of historical importance should be developed. Hajiganj Fort area with river front provided excellent opportunity for development of a recreation center. Hajiganj Fort area can be developed as per the **Vision Master Plan** of Narayanganj City Corporation;
 - Department of Archaeology in collaboration with RAJUK and urban local governments shall initiate programmes to prepare framework plan for heritages.
 - Ministry of Cultural Affairs should sanction necessary budget for this purpose.
- **Implementing Agency:** RAJUK, Local Government Agencies, Department of Archaeology, and Ministry of Cultural Affairs.

BOX-10.2: Development of Green Network

Historically large open spaces with the lushness of nature surrounded the habitation of Dhaka. A famous Mughal garden 'Bagh-e-Padshahi' or 'Bagh-i- Badshahi' (Imperial Garden) was laid on the northern edge of the then Dhaka. Dhaka experienced a northward expansion, while the peripheral green areas were incorporated within the city boundary. During the British era, this green kernel was kept open at the center of the town and a green belt was developed by cleaning the water of Ramna Lake and by huge plantation in the surrounding areas in 1908. A race-course was established within that vast open space that was turned into the Sohrawardy Uddayan in 1972 with huge plantation. Part of this area was developed as Shishu Park in early 80's. Dhaka's interlinked central parks (Ramna, Shishu and Suhararwardi parks) still remain as an increasingly precious legacy with each passing years as the city center is being congested day by day. Moreover, National Stadium Complex and **Old Airport area** also become part of the green network. Considering the importance of green areas in central location for Dhaka's environment, DMDP had already emphasized to preserve the city's central park areas.

To continue the past heritage, a '**Green Network**' can be developed centering the **Old Airport** site turning it into the central green park of Dhaka. This needs to be connected to Hatirjheel area linking Ramna Park, Sohrawardy Uddayan towards south; Sher-E-Bangla Nagar area, Zoo and Botanical Garden towards north-west, and Dhanmondi Lake and BGB area towards south-west (**Figure-10.4**). Thus an interconnected network of green spaces may be created as a linear element connecting all existing major parks, nodes and open spaces including road reserves, utilities reserves, canal and drainage reserves and railway reserves, streams and rivers, scenic roads, and scenic easements, also. Connecting Dhaka University area with the green network will lead to the opportunity to establish an 'eco-friendly' campus. In addition, lake and river corridors i.e. the 'blue core' of Dhaka can also play important role as part of the network.

Large chunks of green areas outside the city centre will be connected through a green network and penetrate into the city centre from every direction. Green network at the city be designed for wildlife and human movement. This may include features such as hiking, bicycling and trails, sidewalks offering an opportunity for people to move around the city without leaving an essentially green environment (soft-traffic corridors for the pedestrian), which is often safer and quieter than roads. They may also provide a focus for the residential communities through which it traverses. To this end, a continuous, pedestrian-friendly system accessible to all including the disabled and complemented by a bicycle network may be completed linking all major activity centers and be fully integrated with public transit nodes.

BOX-10.3: Development of Green Belt along Water Bodies

Implementation of green belt concept can act as buffer zone around the 'blue core' of Dhaka city. There is opportunity to develop a number of landscaped green belts for wetland preservation. In addition, these will create parks/ open spaces for recreation compatible with the wetlands. BIWTA has already determined to preserve 50 meter wide continuous green zone along the 'circular water way' connecting Buriganga, Turag and Balu river in order to protect the foot print of the rivers as well as prevent natural disaster like river erosion. DAP deemed to support this concept which remain unimplemented till today. As the Buriganga River has shifted, a green belt of 10-15 m width is also proposed in DAP to protect the embankment under the Buriganga River Front Development Project. Green belt may thus become part of river front promenade development encompassing few historical buildings and landmarks under conservation of historic relics, neighborhoods for tourism purposes.

For the lake area development in Hatirjheel area, a green belt (15 -20m) has been developed all along the bank of the lake. A number of wetlands/ lowlands have been identified in DAP to be preserved as water bodies (wetlands/ lowlands) inside core city area. To protect such areas from encroachment, some landscape measure is felt urgent. Following DAP proposals, it is urgent to keep at least 2-4m buffer zone with paved area around small sized wetlands in the built up areas. However, in case of large areas of wetlands or for scattered and contiguous pockets of wetlands, larger areas of green belt are proposed. In such cases 5-15m green buffer zone can be preserved which can serve as neighbourhood recreational spot for local people. (**Fig- 10.3**) The DAP has identified the area on Land Use map and authority can take necessary action in order to confirm preservation of such wetlands with green or paved boundary even in case of private property.

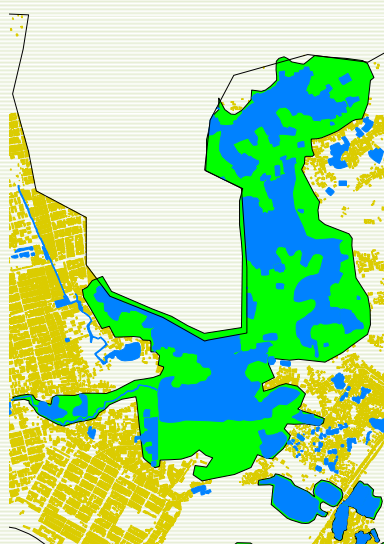


Figure 10.3 Sample Greenbelt around Wetland in Mirpur

Green Network

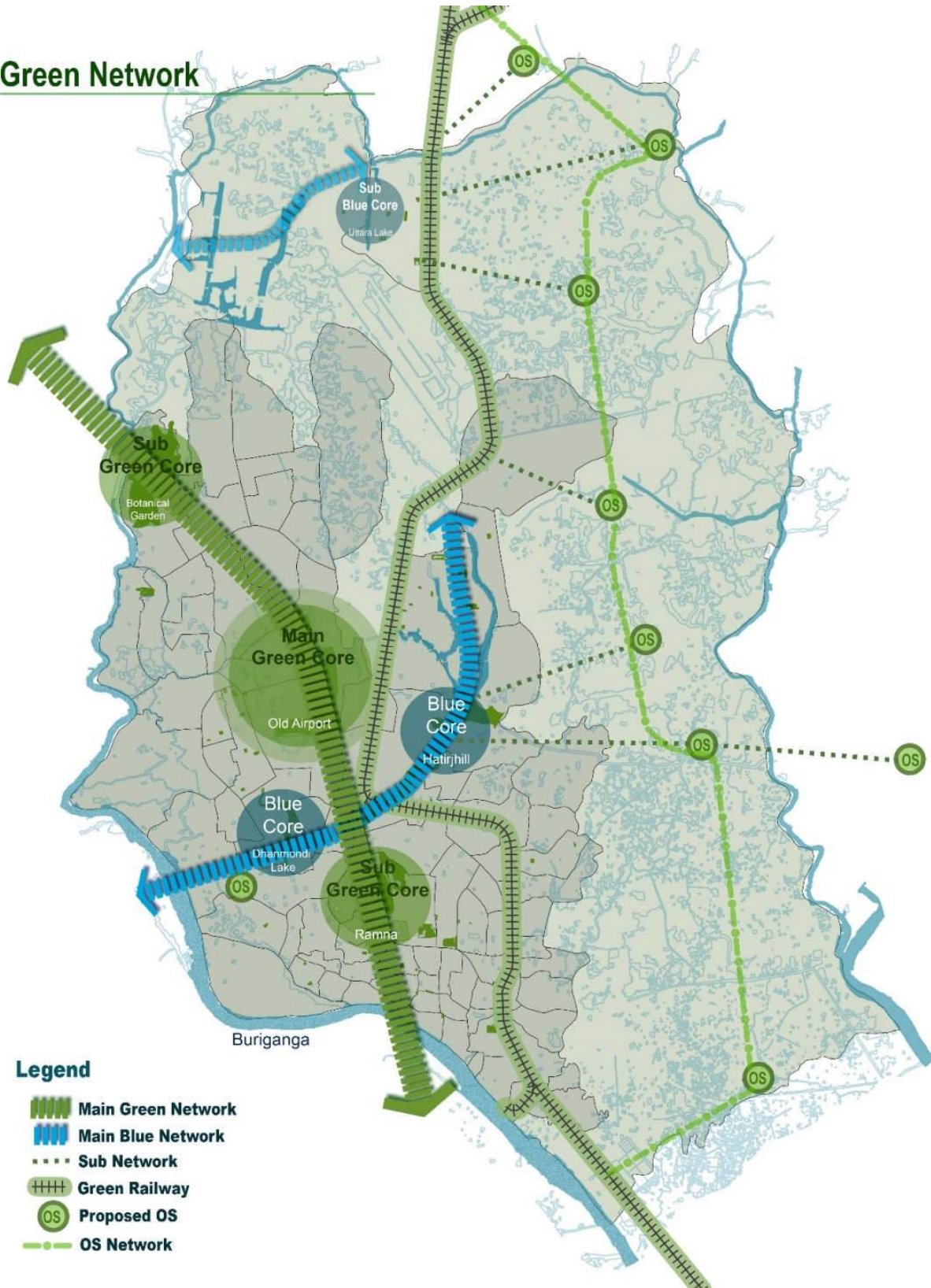


Figure-10.4: Concept of Green Network

BOX-10.4**Urban and Peri-urban Forestry and Greening (UPFG)**

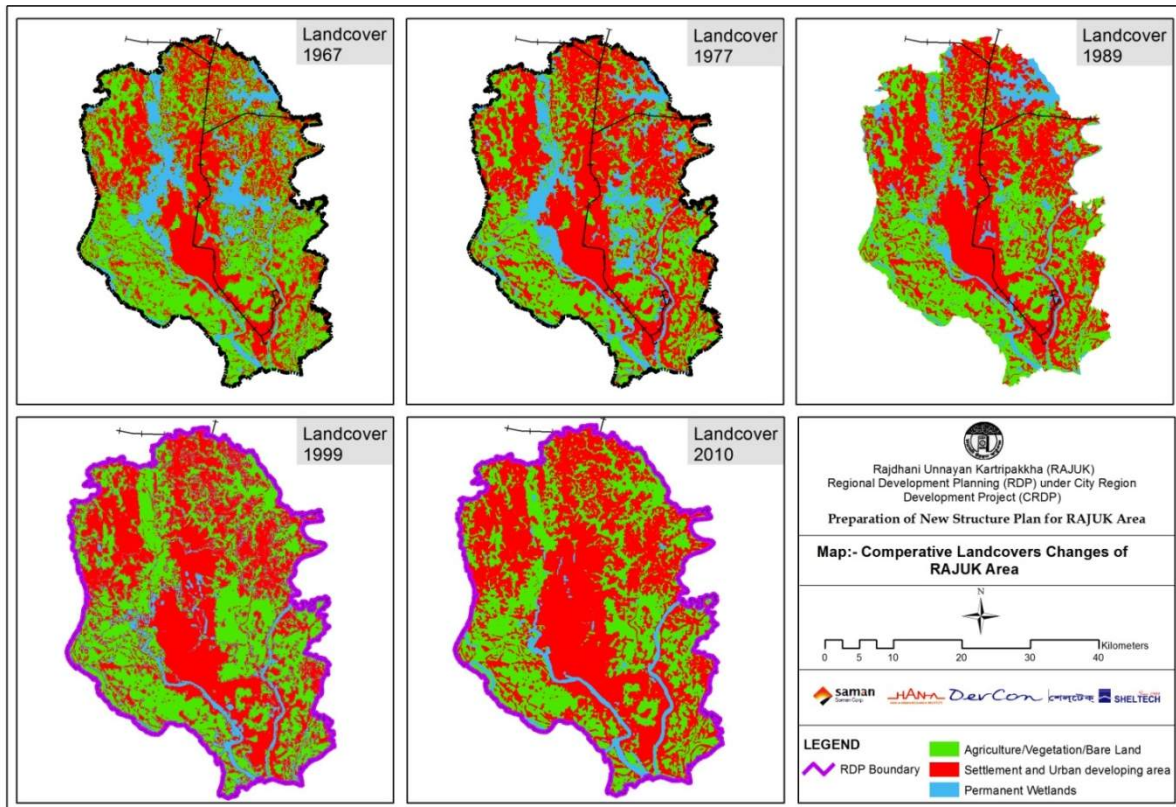
Urban and peri-urban forestry (UPF) is defined as the planned, integrated, and systematic approach to the management of trees in urban and peri-urban areas for their contribution to the physiological, sociological, and economic well-being of urban society. Urban greening refers to any vegetation effort to improve the environmental quality, economic opportunity, or aesthetic value associated with a city's landscape that also include wetlands and farm land. Most of the green areas are managed by the local authority except private gardens, nursery, agricultural land and fruit and other trees within the home premises. Please see **Map-10.1**.

In the past, beyond the boundary of city center of Dhaka, vast green open spaces, mostly owned by private owners, were stretched. However, as the city went through a rapid stage of transition, struggling with the challenges of urban expansion, over population, poverty alleviation, most of the tree-covered areas were gradually transformed to urban habitats. Industrialization in the urban fringe areas caused rapid depletion of existing forest lands. Built-up areas within RAJUK boundary have been experiencing construction boom leaving little greenery inside Dhaka city. The depletion process of green resources got impetus, as the government had no long term planning to keep city green except establishment of a few parks and road side plantations under the city beautification programme.

National Environment Policy 2013 urged to restrict urbanization in agriculture land and to ensure urban plantation for ecological and environmental balance of human habitats. However, due to lack of proper policy to preserve the green in urban and peri-urban areas, it is predicted that the RAJUK area will have to face the challenges of climate change in serious level. In this course, the concept of urban and peri-urban forestry and greening (UPFG) particularly is a promising approach to urban green space planning and management within RAJUK area. Indeed, the green resources within the framework of UPFG in Dhaka city are comprised of;

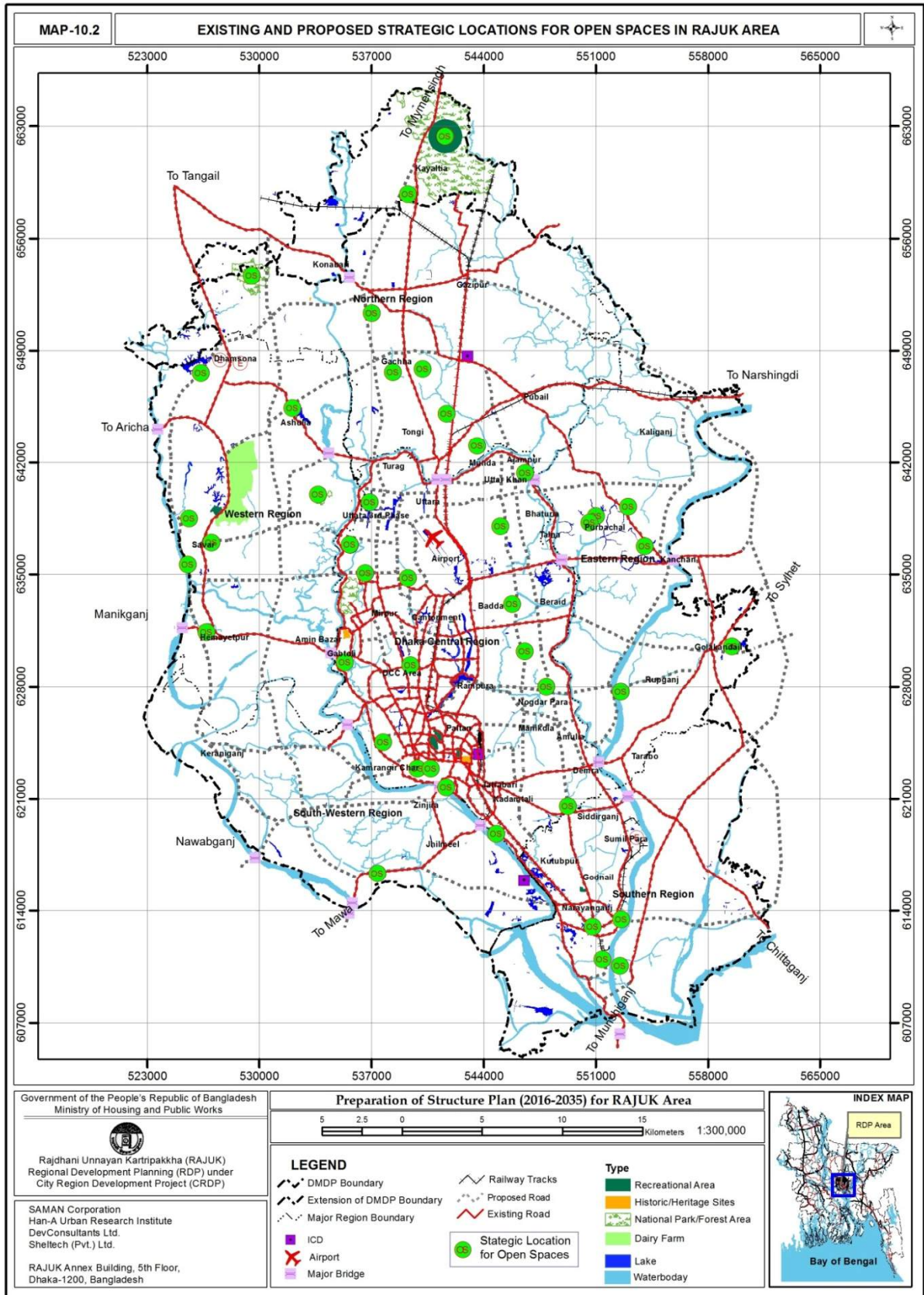
- Trees along the streets in the islands and along the right-of-way, inside paved areas in commercial and residential areas, car parks, etc.
- Public parks, playgrounds and gardens;
- Zoo, sports fields etc.
- Private and institutional play fields, gardens, nurseries, etc.
- Graveyards, cemeteries etc.
- Public and private tree plantations on vacant lots, in green belts, river banks, homestead gardening etc.
- Natural forest under urban influence, such as nature reserves, national parks, forests for eco-tourism outside the city but within the periphery.

The surrounding areas like Savar upazila, Sonargong upazila, and Gazipur district are mostly green as these areas are still in transition from rural to urban. A large tract of forest land, Bahwal National Park in Gazipur, part of Modhupur area, were developed and now being used by the citizens as a natural park for recreation purpose. In Western Region about 1177.76 ha land area belongs to the public facilities. In that area the institutions like Jahangir Nagar University (JU), Savar Dairy Farm, Public Administration Training Center (PATC), BRAC Training Center, Bangladesh Atomic Commission, Bangladesh Livestock Research Institute have vast green areas which may contribute to UPFG of Dhaka. Similarly in the Northern Region, the entire area of Gazipur City Corporation, about 780.31 ha land area belongs to the public facilities like Bangladesh Agricultural Research Institute (BBRI), Central Extension Resources Development Institute (CERDI), Seed Certification Agency (SCA), Dhaka University of Engineering and Technology (DUET), Bangabandhu Sheikh Mujibur Rahman Agriculture University (BSMRAU), National University, Islamic University of Technology, Bangladesh Open University (BOU) which again can enhance and extend the boundary of UPFG of Dhaka.



Map-10.1: Green Area Changes in RAJUK Area

Source: Survey Report RDP, RAJUK, 2013



CHAPTER 11
**RESILIENCE THROUGH
DISASTER PREVENTION
AND MITIGATION**



CHAPTER 11

RESILIENCE THROUGH DISASTER PREVENTION AND MITIGATION

11.1 Introduction

The level of urbanization in Bangladesh is still very low, only about 30 percent, but its pace is rapid. Dhaka as the Capital City is facing tremendous pressure of population every day. It is expected that the percentage of urban dwellers and migrated workers will continue to increase in next couple of decades in this city. Dhaka city creates higher vulnerability indices compared with other megacities in the world by concentrating more population, buildings, infrastructure and economic activities in an unplanned way. A multiplying effect occurs in the urbanized areas due to existence of both natural and man-induced hazards which can pose a threat to its citizens and livelihoods. On this ground, the issue of urban planning and disaster management is crucial in ensuring adequate social, economic and environmental sustainability.

11.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of disaster management of RAJUK area.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Presence of water channels around the city. • Increasing recognition of the need to reduce the adverse effects of natural hazards on urban and peri-urban areas; • Access to water supply for fire extinguishing. 	<ul style="list-style-type: none"> • Incorporating Disaster and Risk Management at planning stage will greatly reduce the risks and vulnerability of the people and community; • Risk reduction as a strategy for development will have long-term advantages for communities and for the institutions involved in disaster management and mitigation;
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Presence of a number of informal settlements in highly hazard exposed and vulnerable locations; • Lack of coordination at implementation stage could hinder progressive development; • Filling and encroachment of flood plains and water bodies; • Poor drainage systems in many municipalities lead to flooding; • Weak enforcement of protection policies for flood plains, hazard prone and low lying areas; 	<ul style="list-style-type: none"> • Vulnerability to flooding due to indiscriminate filling of water retention and flood flow areas. • Over dependency on ground water. • Fire hazards of the interlocked construction is high and the problem is multiplied by poor access; • Failure to execute building control regulations. • Lack of proactive initiative of the responsible organizations could thwart any form of development being proposed in the area;

11.3 Scenario Analysis

11.3.1 Earthquake

Dhaka is listed among the top 20 earthquake-prone cities, because of both, geographical location and unplanned urbanization. Dhaka is located in second zone (medium) in terms of earthquake severity in Bangladesh. A recent study by Geological Survey of Bangladesh (GSB) suggests that the Eastern Fringe of Dhaka lie within the high to very high liquefaction susceptibility range. In Dhaka, an

earthquake from either Madhupur or Dauki fault might cause severe liquefaction effects to buildings, especially those developed on marshy lands on the eastern and western fringes, and even within the city areas like Begunbari and parts of Mirpur where lands are filled with sand and garbage materials. In Dhaka the issues for earthquake scenario are-

- Major seismic sources (plate boundary faults, Dauki fault and Madhupur fault) exist around Dhaka city.
- Natural gas pipelines and connections of electricity can be source of hazard during earthquake because of the possibility of leakage and explosion.
- Absence of critical public facilities (i.e. school, hospital, police station, sewerage system etc) and failure of their proper functioning may have serious impacts on the dwellers, after earthquake;
- City authorities are ill-prepared to face a high-intensity earthquake event because of little contemporary experience.

11.3.2 Flood

Dhaka city was particularly hit by severe floods in 1988 and 1998. During the 1998 flood about 56 percent of the city was inundated, including most of the eastern and 23 percent of the western parts of the city. Over 60 percent of area of this city can be demarcated as flood risk zone considering the flood history of Dhaka city. Flood in Dhaka is caused by high rainfall or by flooding from the surrounding rivers and canals. The western and most densely settled part of Dhaka is protected from river flooding by raised roads and an encircling embankment built after the 1988 flood. The eastern part of the city where most of the expansion taking place consists of low-lying floodplains that are submerged during the monsoon season. The issues for Dhaka's flood scenario are-

- All sides of Dhaka city are bounded by rivers and canals.
- Above 50% of Dhaka is low-lying and inundated during monsoon.
- Filling of water retention areas and drains increases the risk of seasonal flooding.
- Encroachment of rivers and canals can increase flood hazard susceptibility.
- Internal drainage congestion can make the flood situation more complex.
- Poor/ no enforcement of laws in protecting the low lying areas/wet lands in and around the City;

11.3.3 Fire

Fire hazard vulnerability of Dhaka city has increased due to reckless building construction and non-conformation of Fire Protect Act, 2003. Thus fire incident can occur anywhere in the urbanized areas. However, fire incident records within Dhaka city demonstrate that zone of manufacturing industries, slums and squatter settlements and some old parts of Dhaka city are much at risk from fire hazard

BOX-11.1 LIQUEFACTION MITIGATION MEASURES

Large part of the Eastern Fringe is vulnerable to earthquake due to liquefaction effect. However, the DMDP Structure Plan, and subsequently, the Detailed Area Plan (DAP) both endorsed the whole area for future urban development subject to the construction of the eastern embankment along Balu River. Obviously, this strategy evolved keeping the flood hazard in mind and not the earthquake hazard. Now, as the eastern fringe is still in the developing stage, intense appraisal measures have to be taken when approving any development proposals in the area. The particular parcel/segment most vulnerable to liquefaction must be kept free from intense urban uses including residential & commercial structures. Whenever permitting uses in less vulnerable areas, standard approval procedures have to be put into place that rigorously examines essential mitigative measures in the design and construction of structures. Geological Survey of Bangladesh (GSB) has developed an index of structure height in liquefaction areas as presented in **Annex-11.1** which may be followed during building plan approval in the liquefaction prone areas of the eastern fringe area.

susceptibility compared to planned residential blocks, commercial and fringe areas. Recent fire episodes in Nimtoli, an older part of Dhaka city, Tazreen garment and Baubazar and Begunbari slums are the burning examples of fire destruction where many lives and properties were destroyed. The issues for Dhaka's fire hazard scenario are-

- On an average 80% of roads are twisted, narrow and unplanned that can obstacle fire-fighter and ambulance to enter into the spot.
- High traffic congestion all over Dhaka city can delay to respond by the fire-fighter to control the fire event.
- High density areas used for fire prone material storage and industry, having no fire evacuation plan can increase fire accidents.
- Lack of open spaces and scarcity of readily available water sources in neighborhood can accelerate the exposure to fire vulnerability.

11.3.4 Ground Water Depletion

Groundwater of Dhaka city is depleting with an alarming rate having the worst situation in the central part followed by the south-western part. In contrast northern part has relatively a better groundwater condition. However, expanding population is not solely responsible for groundwater depletion whereas various other factors such as the deliberate establishment of deep tube wells, reduction of recharge capacity due to rapid growth of urban structures and climate change altogether results in huge drop of water level throughout the city. The city's groundwater level has dropped about 20 meters over the last seven years at a rate of 2.81 meter per year, and from the year 2000, the rate is increasingly high. Rapid decline in groundwater augment the city's exposure towards multiple risks including land subsidence, groundwater pollution and most importantly paucity of available fresh water that might ultimately results in an urban disaster. The issues of groundwater depletion for Dhaka city are-

- In Dhaka city about 48% of area is urbanized/built-up that cannot help percolate water into ground water.
- Authority highly dependent on groundwater to serve the citizens.
- Very limited alternative sources of water supply and water of rivers located around Dhaka is highly polluted.

11.3.5 Infrastructure/Building Collapse

The causes of building collapse are due to bad design, faulty construction, foundation failure, extraordinary loads, unexpected failure modes, combination of causes. According to a recent survey, 78,000 out of 326,000 buildings in Dhaka were detected as risky. An earthquake with moderate intensity can produce a havoc of building collapse in this city. On 24 April 2013, Rana Plaza, an eight-storey commercial building, collapsed in Savar, a upazila in the Greater Dhaka Area, is considered to be the deadliest garment-factory accident in history, as well as the deadliest accidental structural failure in modern human history.

The recent history of building collapse in Dhaka city suggests that old and dilapidated, newly built but faulty design and overloaded weak buildings are highly at risk of being collapsed. Rajdhani Unnayan Kartripakkha (RAJUK) has classified around 1,000 buildings in Dhaka as 'visibly vulnerable and risky'. The issues associated with building collapse are-

- Low-lying areas and flood-flow zones are being filled up with sand are used for constructing high-rise apartment buildings.

- Old and dilapidated buildings exist in Old Dhaka considered as heritage of Dhaka without considering retrofitting or renewal course of action.

11.3.6 Absence of Disaster Risk Reduction (DRR) Regulation

Development and achievement of the Millennium Development Goals (MDGs) is constrained by disasters and there are many examples that demonstrate the benefits of DRR measures in economic, environmental and social terms. Mainstreaming DRR into national and sectoral development processes such as poverty alleviation, education, health, housing, agriculture, urban development, natural resource management and others, should be reflected in the creation or adaptation of legislation and regulation, codes and standards, resource mobilization and allocation, and implementing and coordinating bodies. For this to be effective DRR should be considered at all levels (national to local) and by all implementing bodies. Without the integration of DRR in all aspects of development, countries efforts to achieve sustainable development and the MDG targets will become more challenging.

11.4 Future Plan and Direction

11.4.1 Goal

CREATE HIGHLY RESPONSIVE AND RESILIENT COMMUNITY IN A SAFE AND PROTECTED BUILT AND NATURAL ENVIRONMENT

11.4.2 Objective and Policy

The aim of the current project is to building a safe and disaster resilient future Dhaka city by developing a holistic, proactive and technology driven strategy through a culture of prevention, mitigation, preparedness and response.

OBJECTIVE-UDM 01: TO MAINSTREAM DISASTER MANAGEMENT IN THE URBAN PLANNING AND DEVELOPMENT PROCESS

Bangladesh is a highly disaster prone area. Apart from its rural areas, urban areas are also equally vulnerable to many disasters. Dhaka city was subject to severe flood disaster during eighties. It has serious threat of earthquake. But the issue of disaster is always side tracked in development process. The issue of disaster must have to be put in the mainstream of development process to save the city from future threat.

Policy-UDM/1.1: Preparation of Comprehensive Risk Sensitive Land Use Plan

Land-use planning provides a set of useful planning tools for mainstreaming DRR into urban development processes, such as mapping, zoning and participatory planning. Risk-sensitive land-use planning is informed by an assessment of risks (including hazards, vulnerability and capacity). Risks can be mapped throughout a city to show the zones with different levels of risk. If risk maps are overlaid on land-use maps, patterns of landuse can be correlated with susceptibility to disasters.

This is necessary to ensure safety of the development taking place in vulnerable areas that

Positive Results of Mainstreaming DRR:

- Improved safety of the people
- Protected built environment
- Safety of critical facilities such as schools, hospitals etc.
- Risk-based land use planning practices to ensure reduction of future risks
- Developed emergency response capacity at the city level
- Prepared community with greater awareness on potential disasters and capacity to respond and manage disasters
- Efficient and capable institutions at the local government level with strengthened capacity to manage disasters
- Sustainable urban growth and governance

might become victim of disaster.

- **Strategic Action:**
 - Insert the issue of risk sensitivity in the land use planning.
- **Implementation Tools:**
 - Including Disaster Risk Impact Assessment in new land use planning project terms of reference and prepare urban land use plans taking account of the risk sensitivity of areas.
 - Provision of Comprehensive Risk Sensitive Land Use Planning should be incorporated in the Terms of Reference of Structure Plan and Detailed Area Plan projects.
 - Provision of adequate park, playground and open areas that can be used as shelter places during the hazard like earthquake, fire incidents etc. This issue has been addressed in **Chapter 10** of this Structure Plan Report.
 - Demarcation of hazard-prone areas, ecologically critical areas, flood plains etc. to make the city resilient to some catastrophic events. This issue has been addressed in **Chapter 08 and Chapter 09** of this Structure Plan Report;
 - Identify low-lying areas and promote schemes to protect the natural environment as a way of retaining the flood retention capacity;
 - Avoid reclamation of flood flow areas;
 - Develop zoning regulations and strictly follow zoning guidelines
 - Deal with environmental issues connected with slums in consultation with residents in poor settlements;
 - Strictly follow BNBC code during the building construction within catchment (500m buffer) of trending fault lines and lineaments;
 - Provision of microzonation mapping considering peak-round acceleration/velocity correlate with local soil profile.
- **Implementing Agency:** RAJUK, Local Government Agencies, and Directorate of Disaster Management.

Policy-UDM/1.2: Preparation of Multi Hazard Risk Mapping for Dhaka

It would enable to identify areas safe for habitation and other development.

- **Strategic Action:**
 - Execute mapping through a project.
- **Implementation Tools:**
 - RAJUK, Directorate of Disaster Management shall immediately take up a project to prepare Multi Hazard Risk Zoning Maps for the entire RAJUK area.
 - Map risk information together with other information such as evacuation routes, and location of temporary shelters and critical facilities (hospitals, schools, etc.)
 - Conduct multi-hazard risk assessments to build an urban risk profile for use in identifying safer locations for development initiatives
 - Create an urban spatial database to monitor development in hazard prone areas
 - Maintain an updated land inventory with details of residential, commercial and industrial buildings, parks, and recreational areas, with their levels of vulnerabilities
- **Implementing Agency:** RAJUK, Directorate of Disaster Management, Local Government Agencies.

OBJECTIVE-UDM 02: TO ENSURE EFFICIENT MECHANISM FOR IDENTIFICATION, ASSESSMENT AND MONITORING OF DISASTER RISKS

Urban areas are high density areas with huge structures and many people and establishments. To get rid of casualties and loss of property it is necessary that structure are built with care taking account of the disasters, like, earthquake and flood. Before any development the site and the structural design of the construction should be carefully assessed so that they are free of risks.

Policy-UDM/2.1: Ensure Earthquake Vulnerability Assessment in Housing Area

This is necessary to keep the future residential areas free of the earthquake risk.

- **Strategic Action:**
 - RAJUK will take initiative for the assessment of earthquake risk to Private Land Developer's housing areas.
- **Implementation Tools:**
 - RAJUK should immediately start framing the above rules with the assistance disaster experts and incorporate same in the law.
 - RAJUK will make earthquake vulnerability assessment of the project sites of private land developers before approval of the project, without the earthquake vulnerability assessment, selected housing area will not get approval from RAJUK.
 - The developers may provide primary or secondary vulnerability data of the site of development.
- **Implementing Agency:** RAJUK, Directorate of Disaster Management.

OBJECTIVE-UDM 03: TO REDUCE THE DISASTER RISKS OF HUMAN LIFE, PROPERTY AND COST

Once a disaster strikes it incurs huge loss in terms of human life, property and the cost of recovery and rehabilitation. All attempts to address disaster should be aimed at reducing the loss of life and property as much as possible.

Policy-UDM/3.1: Introduce Retrofitting or Regeneration Mechanism for Faulty, Obsolete and Dilapidated Buildings.

- **Strategic Action:**
 - Frame regulations about retrofitting under Bangladesh National Building Code (BNBC).
- **Implementation Tools :**
 - Provision about retrofitting should be incorporated in the BNBC so that it becomes a legal binding for the concerned house owners.
 - National Housing Authority should take up programmes and projects for retrofitting of dilapidated buildings.
- **Implementing Agency:** National Housing Authority (NHA), DCC, RAJUK

Policy-UDM/3.2: Monitoring of Flood Protection Embankments around the City.

Strength analysis of embankment encircled around the city requires an investigation for ensuring their sustainability during a heavy flood or an earthquake with moderate to high intensity.

- **Strategic Action:**
 - Provision of regular monitoring and reporting by BWDB.
- **Implementation Tools :**
 - BWDB should make it a routine programme to visit and monitor the condition of embankments every six month and report to the higher authority for necessary action.
- **Implementing Agency:** Water Development Board with assistance of other agencies

Policy-UDM/3.3: Introduce Optimum Plinth Level of Buildings

To keep the buildings free of flooding it is necessary to introduce area specific optimum plinth level of structures by mapping historical flood and analyzing inundation data can reduce the risk of flood and water-logging.

- **Strategic Action:**
 - Incorporation of the provision in BNBC and in BC Rules.
- **Implementation Tools :**
 - RAJUK should take up a project to determining the minimum plinth level of structures for different zones within RAJUK area.
- **Implementing Agency:** RAJUK with assistance of HBRI and other relevant agencies

Policy-UDM/3.4: Monitor and Forecast Demand for Existing and Projected Fire Fighting and Evacuation Facilities.

This is necessary to ensure safety of the city dwellers, especially in the densely populated areas of RAJUK.

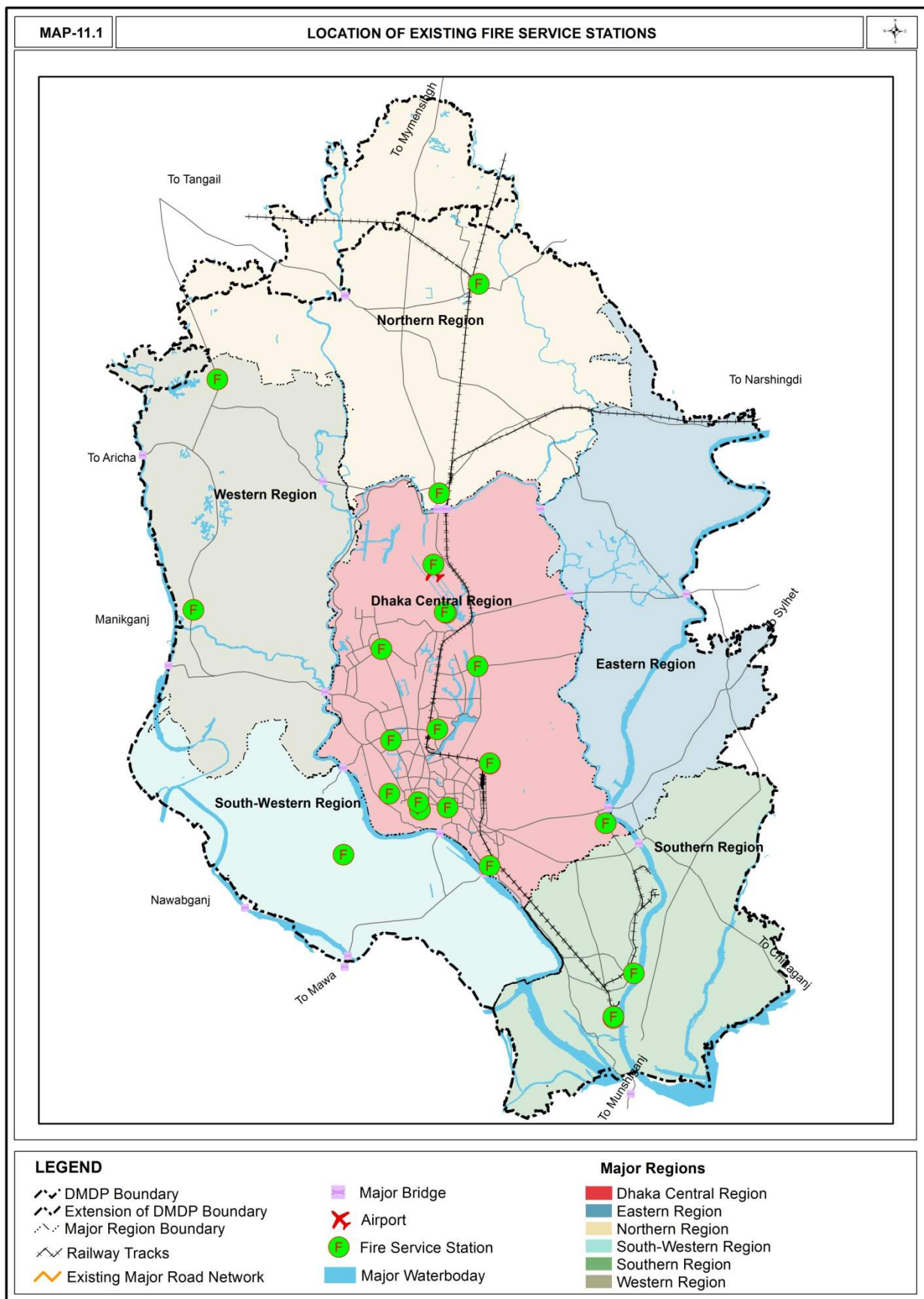
- **Strategic Action:**
 - Formulation of provision of monitoring and forecast of demand of firefighting and evacuation facilities and incorporated in **Fire Prevention and Extinguishing Act 2003** and **BNBC**.
- **Implementation Tools:**
 - Collection of appropriate fire and population development statistics for the purpose of evaluating fire service needs based on existing (see **Map-11.1**) and future conditions.
 - Assure that all areas of the Metropolis have the highest level of fire protection, at the lowest possible cost, to meet existing and future demand.
 - Every high-rise building/commercial block/institute/organization should have obligatory fire evacuation plan.
 - Provision of Sprinkler protection should be accommodated in each high rise building for firefighting;
 - The provision of monitoring and forecasting should incorporate this provision in Fire Prevention and Extinguishing Act 2003 and in BNBC.
 - RAJUK should advise Fire Service Department to increase their existing maximum capacity for fire protection form 16 storied building to firefight with tall building;
 - Fire Stations shall be located on corner plots as far as possible and on main roads with minimum two entries.
 - Preserve River/khal/lake/pond which can be used as alternative sources of water during emergency fire incident;
 - Fire stations are permitted in all land use zones except in Conservation zone.
 - No flammable chemical factory/shops will be permitted within the residential area;
- **Implementing Agency:** Fire Service and Civil Defense and RAJUK

Policy-UDM/3.5: Building Urban Resilience to Floods

Cities that are dependent on flood-control infrastructure tend to address only the river and not the built environment because flood-control infrastructure, as a centralized measure, creates a false sense of security that precludes the need for localized flood-response capacity. Building urban resilience to floods is essentially a process of adaptation—instead of fighting the river, cities live with periodic floods, allowing them to enter the city to learn from them, so as to become resilient to extreme ones.

- **Strategic Action:**
 - Cities that are dependent on flood-control infrastructure are highly resistant but not resilient to floods because they have physically adapted to the artificially expanded dry-and-stable conditions to become intolerant of wet conditions.
- **Implementation Tools:**
 - Open spaces can become multifunctional to convey and store floodwater during wet seasons;

- Infrastructure can be redesigned into a collection of diverse functional elements that are flexible in operation;
- Buildings can be remodeled to be elevated, floatable, or wet-proofed
- Delineate areas of flood Plains and water retention area (see **Map-8.5** and **Map-8.6**).
- **Implementing Agency:** RAJUK, BWDB, Local Government Agencies, HBRI



CHAPTER 12

ENHANCE THE CITYSCAPE WITH URBAN DESIGN AND LANDSCAPE



CHAPTER 12

ENHANCE THE CITYSCAPE WITH URBAN DESIGN AND LANDSCAPE

12.1 Introduction

Urban design describes the physical features of urban areas, characterizing the image of a street, neighborhood, or a city as a whole. Landscape of a city is an integral part of its urban design. Urban design activities are concerned about the visual and sensory relationship between people and the built and natural environment. The built environment includes buildings and streets, and the natural environment includes features such as khals, lakes, and parks as they shape and are incorporated into the urban framework. Landscape mainly shapes up the natural environment in relation to the urban design intervention to the built environment. Essentially an urban design process intends to ensure the quality of urban life by addressing both the functional and aesthetic aspects of a city's built and natural environment. Aesthetics in urban design is combined with other considerations to generate an environment that is visually pleasant, convenient, and comfortable which essentially influences the quality of urban life. Urban design also conveys a sense of place, pride and belonging. The economic and socio-cultural importance of a city determines its character as much as, if not more than, its physical manifestations, and should therefore form urban design considerations.

Urban form and its functions become increasingly important as changes occur in density and intensity over time, as Dhaka evolves. The urban design principles proposed in this chapter are intended to help achieve an identity for the city as a whole while encompassing its physical, social and cultural diversity. A higher overall quality of urban design is another fundamental goal. Citywide urban design recommendations are necessary to ensure that the built and natural environment continue to contribute to the qualities that distinguish Dhaka city as a unique living environment. It is intended that the urban design policies be further supplemented with site-specific community plan recommendations at the level of detail area plan.

12.2 SWOT Analysis

This section of the chapter gives a short SWOT analysis of Urban Design and Landscape of RAJUK area.

STRENGTH	OPPORTUNITY
<ul style="list-style-type: none"> • Strong presence of vegetation in suburban areas of the city. • Less encroached water channels in the suburban areas. 	<ul style="list-style-type: none"> • Undeveloped suburban areas provide scope for urban design exercise. • Available green and waterbody in the core city.
WEAKNESS	THREAT
<ul style="list-style-type: none"> • Lack of definition and standard in Dhaka's spatial network. • Overall streetscape has no consistency. • Absence of distinctive skyline of its own giving a sense of identity. • Disintegrated and scattered green space. • Absence of defined boundary of urban space, node and plaza. • Once source of amenity Dhaka's network of canals almost filled up. • Absence of urban design regulations. Weak enforcement of development control regulations. 	<ul style="list-style-type: none"> • Ignorance to urban design practices by urban planning and development agencies. • Failure to conceive the need for aesthetics in cityscape by decision makers.

12.3 Scenario Analysis

Dhaka City has grown at a phenomenal rate driven, primarily, by the need to accommodate influx of people. It is the primate city and over the years it has developed as the most important centre for business, education, and administration. Pressed by huge population, changes are occurring continuously in living space and pattern of the city. To accommodate changes traditional living space in older part of the city is being demolished and rebuilt. Traditional horizontal living space is now being converted to vertical with compact and congested living space. The interaction spaces for the community are gradually disappearing. Modernization and construction of high-rise buildings deteriorated the built environment of Dhaka without any consideration for the consequences of disappearing open spaces and water bodies.

Dhaka's distinctive character emerged from its natural setting of khals, lakes, and parks that allowed the evolution of geographically distinct neighborhoods. Previously, the network of water flow created a natural open space system that extended through many parts of the city and was distinguished from other cities. The vegetation and Dhaka's climate such as rainy season influenced built environment and outdoor activity of all kinds. Due to the ever-increasing economic activities Dhaka today has turned into a busy city. True that Dhaka continues to ensure means of sustenance for its inhabitants but in lieu she is losing her ecological balance, opportunities of interaction are lost as the open places disappear. Many open spaces are being grabbed by Government organizations and floating people. Similarly, the lakes and retention areas are being filled up by vested groups. The city puts its back to these prominent natural elements instead of integrating those with the urban fabric. As a result impact of these natural elements as attractive areas and in determining scale and orientation to the city dwellers are lost.

As a whole, Dhaka lacks its identity and orientation. Views are important as orientating devices and also as a means of comprehending the city as a whole. Dhaka has experienced rapid development with mushroom growth of buildings which has left a city in many respects, disjointed with missing visual and physical coherence. The common structures are erratically disregarding the building construction rules and creating a chaotic representation. Dhaka's notable buildings and natural elements are neither protected nor integrated with the city structure. Roads and rail-based transportation of Dhaka city give an awful impression to visitors. As a result, there has been a decrease in the legibility of the city structure together with a certain loss of historical continuum and sense of identity.

Roads have been developed in a piecemeal fashion and at any level the road system in Dhaka has never considered as a comprehensive network. Rail lines and river network also remain disjointed. The linkages among different transport systems, particularly between major and minor segments of roads, lack clarity in movement pattern. Even the major spatial network as identified in planning documents, is never developed with standard facilities. Moreover, the organic grid generated in due course of time is never integrated into planning considerations and never developed up to any standard. A major part of urban dwellers in Dhaka are pedestrians who suffer from such appalling situation. Besides, passengers moving by bus or car on roads and flyovers also lack convenience as well as orientation. Streetscape treatments that create memorable urban corridors and nodal space can help to reinforce the coherence and legibility of the road system that impacts livability of the city.

A major challenge for the city is to return to the traditional pedestrian-oriented forms of development but with modifications to reflect modern realities such as safety, unofficial transports dependency and crime. As Dhaka becomes more urbanized, there is a need to address urban form and design through policies aimed at respecting our natural environment, preserving open space systems and targeting new growth into compact city.

12.4 Critical Issues

a. Spatial Network and View Corridors

The major spatial network in Dhaka lacks sufficient definition and standardization in terms of facilities and character thereby impairing the 'Legibility' of the city. There exist no hierarchy of streets to ensure clarity in movement pattern and orientation creating confusion among the users and ambiguity in providing services. The existing network of streets is rather disjointed and haphazardly organized. All entry points or gateways to the city lack sufficient definition as points of arrival. Significant view corridors to major landmarks like lakes and landmark buildings are not defined and protected. The views and vistas from water-based and rail-based transportation usually focus the filthy areas of the city thereby giving awful impressions to the travelers.

b. Streetscape

The overall quality of streetscapes is affected due to lack of consistency and continuity of streets' character as represented by pavements, building frontages, street lighting, traffic signals, signage and other forms of street furniture. Deficiency of landscape amenity along major roads gives unpleasant look creating negative psychological impact among the city dwellers and the tourists. Walkability of the streets is hampered due to the poor physical condition of sidewalks, discontinued networks and obstacles. Overhead cable networking in all streets is creating a clumsy appearance.

c. Skyline and Landmarks

Dhaka has no distinctive skyline of its own giving a sense of identity within the city or in local areas. The city's development is aimless and disorganized. The city lacks a good number of eye catching formal visual structures. Besides, natural elements identifiable as landmarks of Dhaka are not preserved. Landmarks in Dhaka, in fact, are not identified and listed yet, except a few historical structures [see heritage part of chapter 10] for cultural preservation and identity. There remains no regulation or development control per se to regulate the construction of different type of structures surrounding the landmarks or to maintain the distinctive skylines, if any.

d. Green Network

Green areas inside the city remain as scattered and disintegrated elements with negligible contribution to environmental qualities and ecological balance. Increase of cars and hard surfaces in the city center reduces livability endangering ecological balance.

e. Urban Space, Nodes, Plazas and Parks

Urban spaces, Nodes, Plazas and Parks in Dhaka lack defined boundary and identification. They are not well maintained and not properly used. Urban spaces in Dhaka area rarely prepared to celebrate the spaces and the events. There remain no facilities and opportunities to have an outdoor life in private or public scale except a few exceptions like Raman Park, Dhanmondi Lake etc. Night life is never considered in urban outdoor areas to support the citizen and tourists. There remains major deficiency of parks and open spaces inside city center. None of the parks in Dhaka are enjoyable for passive recreation with nature nor appear as breathing spaces. [See Chapter 10, Open Space and Recreation]. Besides, the plazas are not designed or prepared to be marked as major nodal activity areas where there is a confluence of people.

f. Khal, Lake and River Corridors

There were connected network of canals in Dhaka which are almost filled up and the urban life and built fabric of the city face back to its khals and canals. In addition to their inability for drainage purpose, khals and lakes of Dhaka have a little impact on the image of the city. Khals and rivers of Dhaka provide an opportunity to create a significant amenity, which are merely recognized as one of the symbolic element. Circular waterways around the core city are not maintained and it does not provide any facility for navigation and integration with the city core.

g. Pedestrian Linkages

A significant portion of trips of Dhaka city dwellers are on foot but there remains no legible pedestrian patterns either at city center or at local level. Most of cases there are conflict between vehicular and pedestrian traffic and pedestrian malls lack continuity of access throughout the city. Amenity and safety provision for pedestrians generally lack in Dhaka.

There is a lack of continuity of pedestrian and open space linkages

h. Urban Identity

- **Distinctive Urban Areas**

Dhaka city lacks definition of distinctive urban areas which have the character and distinctiveness of districts and local precincts in providing interest, texture and structure to the urban form as well as increasing the sense of belonging. This character can result from particular activities or from attractive historic, cultural, architectural, landscape or townscape features.

- **Conservation Areas**

Diversity and distinctiveness of the different ethnic precincts, like Shakhari Bazar and Chawk Bazar areas, are not preserved and conserved for city's architectural and cultural heritage. Conservation guidelines needs to be extended to cover new development in the vicinity of conservation areas to make sure that it is complementary in scale and character.

i. Architectural Character

The architectural character of the buildings of Dhaka reflects mainly technological and global aspirations. Design of many new buildings is not sympathetic to the climate. The tropical location as well as the people and their values are less represented in the Architecture of Dhaka. Due to absence of effective urban design and planning framework buildings are sometime not responsive to the built and natural environment and do not contribute positively to the urban landscape. Existing Building Construction Rules and National Building Codes are constantly ignored and the build environment shows extreme of haphazardness all over Dhaka. The National Assembly Building Complex, historical areas of old Dhaka and newer planned localities are areas with a distinctive history, culture and social composition. The unsympathetic intrusion of new development into traditional areas and the awkward juxtaposition of new development in relation to each other and existing development is one of the major problems in Dhaka.

j. Urban Pattern

One of the important phenomena is the co-existence of two different urban patterns - Planned part and Organic or Unplanned part – side by side in Dhaka. Among the Planned areas there are two distinct types such as fine grained planned residential part (Dhanmondi, Banani-Gulshan) and coarse grained institutional part (Sher-e-Bangla Nagar).

Besides, unplanned areas also have two major types, like the dense areas of Old Dhaka and other organic areas in newer part of Dhaka (Kalabagan, Moghbazar). These four types of urban pattern are very discrete in their morphology which is never address institutionally and there remain same building regulations for all areas, which is detrimental in terms of urban pattern and their development. Major new infrastructures, like flyover, are not sensitively integrated with the overall urban pattern.

k. Urban Design Application

Historically old Dhaka had a strategic urban design approach which is observed in creating chawks, nodes and streets. However, the newer part of Dhaka grew in a spontaneous way and there remain no norms and practices in general for Urban Design. As a result city gives a very haphazard and incongruent look in every aspect. It is an urgent need to develop a set of urban design guidelines for application in city-wide commercial, industrial, institutional and residential and mixed-use developments. At the level of Detail Area Plan (DAP) a complete 'Urban Design Framework' for the whole of DMDP area with particular reference to the core city and other urban centers following the policies needs to be formulated. This framework will form the basis for a comprehensive set of urban design guidelines to direct improvement initiatives and future development in the city.

As urban design will assume a new significance in the planning and design of the city, it is appropriate that a special body is formed with the purpose of coordinating the development activities of all departments involved in urban development.

12.5 Future Plan and Direction

12.5.1 Goal

INTEND TO ENSURE THE QUALITY OF URBAN LIFE BOTH THE FUNCTIONAL AND AESTHETIC ASPECTS

From this general discussion the following goals have been determined for urban design for future Dhaka:

- A city with **distinctive identity** and **image emphasizing** its natural **environment and landmarks** with **architectural significance and cultural heritage**.
- A city which is highly **legible and accessible** for all its occupants and users, in particular one that is **pedestrian and handicapped friendly**.
- Ensuring an improved quality of life with an environment which is **functional and livable, safe, secure, clean, aesthetically pleasing and user friendly**.
- Provision of a single body with overall responsibility for **devising, coordinating and implementing urban design policies**.

12.5.2 Objective and Policy

a. Urban Form

OBJECTIVE-UD 01(Spatial Network and View Corridors): TO SECURE LEGIBILITY OF DHAKA CITY IDENTIFY THE MAJOR SPATIAL NETWORK AND IMPORTANT VIEW CORRIDORS.

Policy-UD/1.1: Ensure Clarity in Movement Pattern and Orientation by Identifying Major Spatial Network, Ensuring Standardized Facilities and Retaining their Visual Quality along with Emphasis to Important View Corridors.

In Dhaka, legibility of urban form is hampered due to lack of sufficient definition & standardization of major spatial network and hierarchy of streets. Major visual corridors towards landmark buildings and along the prominent water bodies' are not protected and entry points to city are not marked properly.

- **Strategic Action:**
 - Adoption of the Policy as a government recognized 'design concept' for the whole city.
 - Official recognition and adoption of the concept/policy by different government agencies and integration with the relevant actions for transportation, utility services and area development.
- **Implementation Tools:**
 - Identify and integrate the major spatial network like, road, water way and railway and define their character based on functional and perceptual criteria;
 - Determine and maintain a hierarchy of streets for ease of movement & orientation;
 - Identify and enhance the visual quality of vistas of city with sequential visual experiences along major road corridors leading towards the city centre;
 - Preserve the major visual corridor towards landmark buildings and along the prominent water bodies;
 - Provide marking of arrival to the city at all the entry points or gateway.
- **Implementing Agency:** Ministry of Housing and Public Works, Ministry of Local Government, Rural Development and Cooperatives, Ministry of Roads and Bridges, RAJUK, LGED, City Corporations and Municipalities, Directorate of Architecture, BWDB.

OBJECTIVE-UD 02 (Streetscape): TO ATTAIN COHERENCE AND LEGIBILITY IN DHAKA'S STREETScape OF MAJOR ROAD

The overall quality of streetscapes should be standardized ensuring effective channelization of vehicles and pedestrians and also giving a pleasant look. There should be consistency and continuity of streets, their pavements and street furniture for the city centre as well as different parts of the city.

Policy-UD/2.1: Implement Measures to Improve the Visual Definition, Continuity and Streetscape Character of the Major Road Network, to provide Greater Coherence and Legibility within the Urban Areas.

- **Strategic Action:**
 - Government prepares Guidelines for standardization of streetscape character;
 - Official recognition and adoption of the Guidelines by different government agencies ensuring coherence during street development.
- **Implementation Tools:**
 - Ensure treatment of streets and their frontages with pavements, building frontage, street lighting, traffic signals, signage and street furniture in a hierarchical order during street design following the policy;
 - Ensure Walkability of the streets by improving physical condition and continuity of pedestrian network, integrating green network in required locations.
- **Implementing Agency:** Ministry of Housing and Public Works, Ministry of Local Government, Rural Development and Cooperatives, Ministry of Roads and Bridges, RAJUK, LGED, Directorate of Architecture, BWDB, Urban Local Governments, City Corporations and Municipalities.

Policy-UD/2.2: Ensure Carefully Deigned Plantation as an Essential part of Urban Streetscape.

Plants along street render multifarious benefits. They keep the environment cool during hot summer; they are a source of oxygen; they create attractive and pleasant streetscape; they are a source of ecological balance and identity.

- **Strategic Action:**
 - Government recognition of the policy on street landscape and execution during detail design;
 - Adoption of the Policy by City Corporations and Municipalities; and execution during street development.
- **Implementation Tools:**
 - Encourage profuse plantation along the streets in public and private land;
 - Preserve the existing trees with care.
- **Implementing Agency:** Ministry of Housing and Public Works, Ministry of Local Government, Rural Development and Cooperatives, Ministry of Roads and Bridges, RAJUK, LGED, Directorate of Architecture, City Corporations and Municipalities.

OBJECTIVE-UD 03(Skyline and Landmarks): TO PRESERVE THE AVAILABLE IMPORANT VISUAL STRUCTURES AND NATURAL ELEMENTS AS DISTINCTIVE LANDMARKS.

Many important visual structures and natural elements are already available in the city, but they are never listed nor focused to attain legibility of urban form. To highlight these structures of culture heritage and natural elements there is a need to identify, enlist and preserve them.

Policy-UD/3.1: Identify, Enlist and Preserve Formal Large-Scale Visual Structures and Natural Elements to ensure distinctive landmarks of cityscape as orienting devices.

Important landmarks, including structures and natural elements, ensure a sense of identity within the city or local area. Therefore, it is essential to preserve and identify culture heritage and natural elements.

- **Strategic Action:**

- Prepare a Comprehensive Plan under Government initiative to preserve different types of Landmarks with care and ensure maintenance.

- **Implementation Tools:**

- Fixing uniform and specified criteria for Listing of Landmarks by appropriate authorities;
- Identify and list up all visually attractive and historically important structures and natural elements, like, lake, khal, river, garden.
- Take appropriate legal administrative measures to preserve them ensuring their visibility.
- Take up projects for preservation and integration of landmarks with urban space through design at local level.
- Incentives, like tax relaxation and loans for development, to owners of landmarks for preservation.

- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, Department of Archaeology, Ministry of Environment and Forestry.

OBJECTIVE-UD 04(Skyline and Landmarks): TO DETERMINE AND PRESERVE THE DISTINCTIVE SKYLINES AND VISTAS AS THE CITY'S IDENTITY AND SYMBOL

A pleasant and adorable skyline and/or an important vista are attractions for any large city. The skyline and vistas add to the aesthetics of city. The skyline and vistas should be maintained with appropriate rules and regulations.

Policy-UD/4.1: Determine and Ensure Retention and Enhancement of Important Views of City's Skyline and Vista.

- **Strategic Action:**

- Formulate Rules to control development compatible in height, size, scale, style, materials, or design of a new development within a block, street frontage, or group of buildings to protect and enhance the important skylines and vistas.

-

- **Implementation Tools:**

- Identify and enlist the formal large-scale visual structure and delineate the distinctive skylines of Dhaka and their preservation;
- Design and establish new landmarks and create new skyline and preserve them;
- Ensure the retention and enhancement of important view and city's skyline from urban centre and public open space outside the city centre.

- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, Department of Archaeology, Ministry of Environment and Forestry.

Policy-UD/4.2: Encourage Development of New Landmark Building or Complex at Key Locations

- **Strategic Action:**
 - Formulate development control rules allowing to create new skylines and to introduce new landmarks.
- **Implementation Tools:**
 - Initiation of new projects and undertaking new programme for area development;
 - Create new land mark in important locations on public or private initiative;
 - Encourage private sector to develop land marks.
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, Department of Archaeology

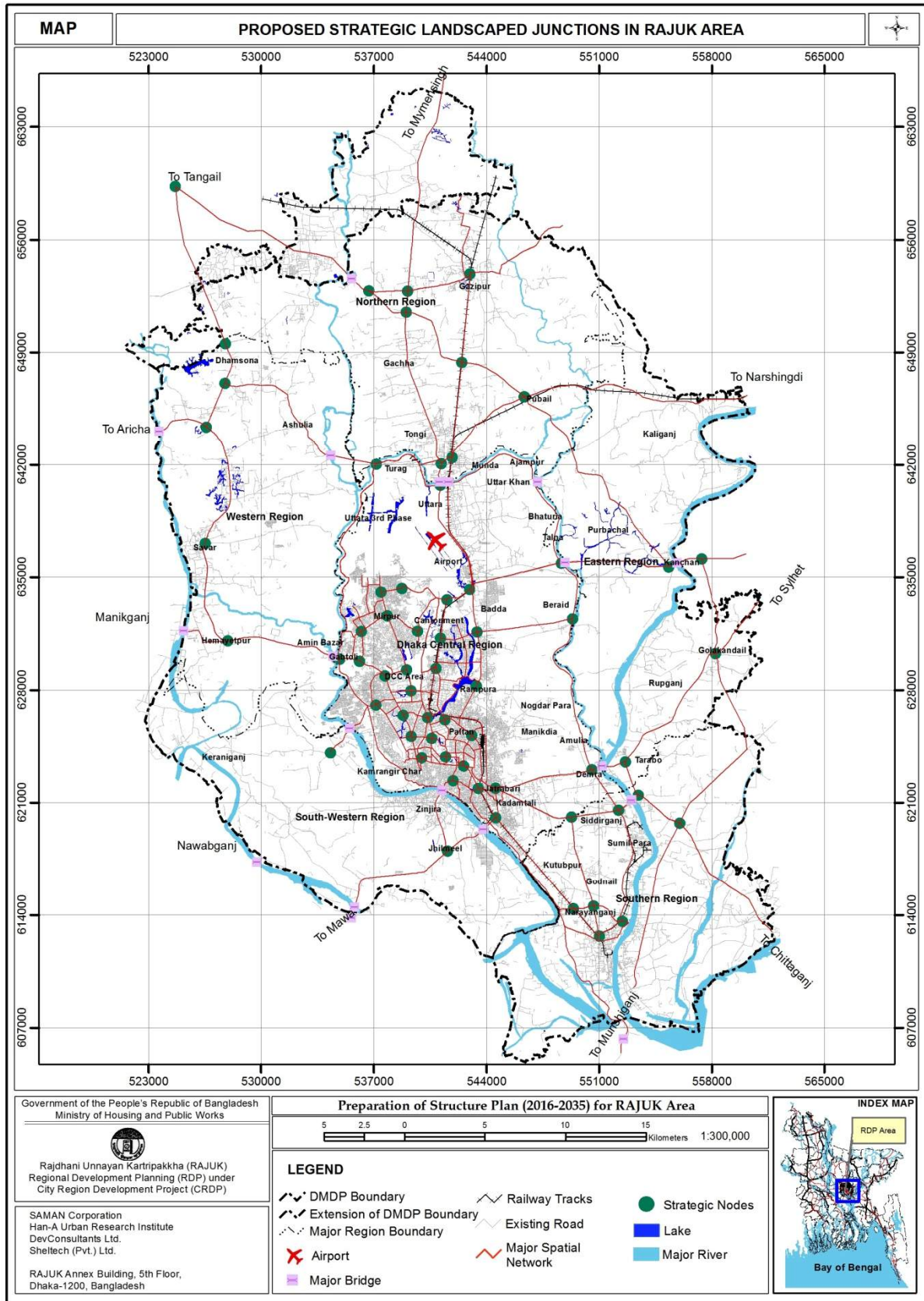
OBJECTIVE-UD 05(Designated and Special Character area): TO PRESERE CHATRACTER OF DESIGNATED AREAS, ENTRIES AND NODES.

Policy-UD/5.1: Control Development in Critical Areas of the city so as to Ensure Visual Primacy of Designated Areas in the City Core, the Protection of Special Character of Areas and the Accenting of Entry Gateways and Activity Nodes.

- **Strategic Action:**
 - Initiate a comprehensive plan with the help of specialized personnel for identification of critical areas, entry gateways and activity nodes;
 - Formulate rules to control height, size, scale, style, materials, or design of buildings in critical areas like designated areas in the City Core; the entry gateways and activity nodes.
- **Implementation Tools:**
 - Incorporate the rules in the BC Rules for legalization and application;
 - Formulate projects for individual areas, gateways and nodes.
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, relevant Professional bodies.

Policy-UD/5.2: Retention and Enhancement of Major Planted Areas and River Banks As Visual Backdrops, Orientating Elements and Landscape Amenity.

- **Strategic Action:**
 - Initiate a comprehensive plan determining criteria in identifying the major planted areas and river banks as city's assets.
- **Implementation Tools:**
 - Prepare a project and take approval.
 - Prepare design for plantation including selection of trees along river banks to create landscape amenity.
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, Ministry of Environment and Forestry, BIWTA.



Map-12.1: Proposed Strategic Landscaped Nodes in RAJUK Area

b. Urban Linkage

OBJECTIVE-UD 06(Green Network): TO DEVELOP GREEN & BLUE (WATER) NETWORK THROUGH FRAMEWORK OF LANDSCAPED CONNECTIONS FOR CREATING FOCUS.

Landscaped connections will be created utilizing road, rail and river corridors, infrastructure and utility reserves, parks, plazas and widened landscaped street verges [see map in chapter 10, open spaces and recreation].

Policy on the above objective has been provided in Chapter 10

OBJECTIVE-UD 07(Urban Space, Nodes, Plazas and Parks): TO GIVE IDENTITY OF PLACES ENSURING CITY IMAGE SPACES, NODES, PLAZAS AND PARKS TO BE DEVELOPED AS PER STANDARD.

Space, node, plaza and park are not only amenities, they form parts of city's identity and pleasure. They need to be developed and maintained to provide greater facilities and access to the users ensuring outdoor space for day and night life.

Policy-UD/7.1: Identify Incidental Spaces and Nodes and develop them as Parks and Plazas.

- **Strategic Action:**
 - Initiate a comprehensive plan to implement policy decision, project formulation, approval and execution.
- **Implementation Tools:**
 - Define boundary and identification of urban spaces, nodes, plazas and parks;
 - Construct enjoyable parks and plazas for passive recreation purpose on a nodal points;
 - Develop the places where informal cultural performances in taking space;
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, Department of Roads and Highways.

OBJECTIVE-UD 08 (Khal, Lake and River Corridors): TO MAXIMIZE THE AMENITY VALUES OF WATERBODIES

Available river, khal and lakes are blessings of nature for Dhaka City. They need to be preserved and enhanced to maximize their amenity values.

Policy-Ud/8.1: Designate Canal, Lake and River Corridors to Improve their Amenity Values.

- **Strategic Action:**
 - Government initiative is needed to implement the policy decision, project formulation, approval and execution.
- **Implementation Tools:**
 - Identify and recover the Canal, Lake and River Corridors for public use.
 - Prepare a comprehensive development plan with vegetation and pedestrian walkways, cycle ways and clean water;
 - Create water based open space for breathing, enjoyment and bio-diversity.
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Directorate of Architecture, Ministry of Environment and Forestry, BIWTA.

Policy-UD/8.2: Formulate Regulations to Control Development Along the River Corridors to Render the Rivers, Lakes and Canals Attractive.

- **Strategic Action:**
 - Formulate rules to control development along river and lake corridors.
- **Implementation Tools:**
 - Creation of a committee comprising professions, development control personnel, bureaucrats.
 - Formulate rules to control development along the river corridors to render the rivers, lakes and canals attractive.
 - Incorporate the rules in the BC Rules for legalization and application.
- **Implementing Agency:** RAJUK, IWTA, City Corporations, Directorate of Architecture, relevant professional bodies, Ministry of Environment and Forestry, Directorate of Urban Forestry.

OBJECTIVE-UD 09 (Pedestrian Linkages): TO ENSURE WALKABILITY IN URBAN STREETS

Currently, about 22% of the min city mobility takes place on foot. A large section of the people wishes to travel on foot. But due to absence of pedestrian facilities in the sidewalks these people refrain from walking. To generate more people on foot it is necessary to ensure walkability in sidewalks. On health ground and to reduce pressure on street motorized and non-motorised traffic on foot movement should be encouraged.

Policy-UD/9.1: Develop and Maintain Sidewalks in User Friendly Way to ensure Walkability.

- **Strategic Action:**
 - Standardization of Sidewalks for different types of Streets based on their hierarchy and demand.
 - Adoption of the policy by City Corporations and Municipalities in developing sidewalks.
- **Implementation Tools:**
 - Execute the policy during design and construction of streets sidewalks.
 - Enforcing law to evict the unauthorized uses from sidewalks ensuring walkability.
- **Implementing Agency:** Ministry of Local Government, LGED, Rural Development and Cooperatives, City Corporations and Municipalities, RAJUK, Department of Roads and Highways.

Policy-UD/9.2: Designate and Implement Pedestrian Friendly Legible Street Networks and Green pedestrian networks in continuation.

- **Strategic Action:**
 - Develop existing sidewalks and new sidewalks in user friendly manner within the city centers, major activity nodes and areas surrounding transit nodes.
- **Implementation Tools:**
 - Take up project to redevelop existing sidewalks and green in user friendly way.
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Department of Roads and Highways.

Policy-UD/9.3: Ensure Amenity and Safety of Handicapped and Elderly Pedestrians.

- **Strategic Action:**
 - Develop Standards to develop sidewalks.
- **Implementation Tools:**
 - Take up project to redevelop existing sidewalks and new sidewalks.
- **Implementing Agency:** City Corporations and Municipalities, RAJUK, Department of Roads and Highways.

c. Urban Identity

OBJECTIVE-UD 10(Distinctive Urban Areas): TO IDENTIFY THE DISTINCTIVE URBAN AREAS AND PROVIDE INTEREST, TEXTURE AND STRUCTURE TO CREATE COHERENT AND HIGHLY IMAGEABLE URBAN FORM

Every city should have its own distinctive urban form. To create urban form the distinctive urban areas in districts and local precincts like river bank areas are identified and infused interest, texture and structure to create urban form.

Policy-UD/10.1: Define, Conserve and Enhance Distinctive Identity Areas, both Old and New to Create Coherent and Highly Imageable City Form.

- **Strategic Action:**
 - Initiate a comprehensive plan with the help of specialized personnel for identification of distinctive identity areas.
 - Formulate rules to control height, size, scale, style, materials, or design of buildings in distinctive identity areas.
- **Implementation Tools:**
 - Follow the decision during execution of urban development projects.
- **Implementing Agency:** RAJUK, City Corporations, and Municipalities.

Policy-UD/10.2: Integrate the Diversified Areas into a Vibrant, Coherent and Highly Imageable City Form.

- **Strategic Action:**
 - Initiate a comprehensive plan to identify and integrate the potential diversified areas.
- **Implementation Tools:**
 - Follow the decision during execution of urban development projects.
- **Implementing Agency:** RAJUK, City Corporations, and Municipalities.

OBJECTIVE-UD 11 (Conservation Areas): TO PRESERVE AND CONSERVE CITY'S ARCHITECTURAL AND CULTURAL HERITAGE

Heritages are identities of nations that reflect their life and culture. In order to uphold self-importance, as well as tourist attraction all heritages should be preserved. Designate the conservation of areas like Farashganj, Shankhari Bzar and Sutrapur and Raman & National Assembly Complex, National Mausoleum and places, landscapes and structures of historical and architectural value and significance, and ensure that all developments in their vicinity are sympathetic in form, scale and character

Policy in this respect has been presented in Chapter-10.

OBJECTIVE-UD 12 (Architectural Character): TO CREATE AN ARCHITECTURAL DESIGN FOR THE CITY COMPATIBLE TO LOCAL CLIMATE, BUILT ENVIRONMENT AND NATURAL CONDITION

Unique architecture of a city gives the city a special identity. It enhances visual image and forms an attraction to the visitors.

Policy-UD/12.1: Ensure a High Standard of Architectural Design Appropriate to the City's Regional Tropical Setting and Sympathetic to the Built and Natural Conditions.

- **Strategic Action:**
 - Formation of committee comprising professionals, academics, bureaucrats to decide on standard of architectural design.
- **Implementation Tools:**
 - Approval of the design by the government.
 - Directives to be issued by the government to all concerned to follow the design.
 - Incorporate the rules in the BC Rules for legalization and application.
- **Implementing Agency:** RAJUK, Directorate of Architecture, relevant professional bodies and academics.

Policy-UD/12.2: Ensure the Historical and Original Character of National Assembly Building Complex Areas and Traditional Areas of Old Dhaka during any Redevelopment Attempt.

Architectural design form to be agreed by the professionals and recognized by the government for application.

- **Strategic Action:**
 - Identification of characters to be retained during any redevelopment in stated areas.
- **Implementation Tools:**
 - Monitoring and execution of Government decisions during redevelopment.
- **Implementing Agency:** PWD, Directorate of Architecture.

d. Urban Pattern

OBJECTIVE-UD 13: TO PROTECT INHERENT CHARACTER OF VARIED URBAN PATTERN

The built up part of Dhaka city exhibits varied urban pattern. Old Dhaka with high density and congested structures along with narrow road pattern has one pattern. Planned residential areas like, Dhamandi, Mohammadpur has another pattern. This varied character of Dhaka need to be protected to create a sense of distinctive diversity of urban pattern.

Policy-UD/13.1: Devise Separate Planning Rules to Preserve Intrinsic Character of Areas with Distinctive Urban Pattern

Areas with distinctive urban pattern in the existing city need to have separate set of buildings construction rules in order to preserve their intrinsic character as well as to guide the users to get maximum benefit from the prevailing patterns.

- **Strategic Action:**
 - Formulate different planning rules for diversified urban patterns to be used during redevelopment of different parts of the city.
- **Implementation Tools:**
 - Incorporation of rules in BNBC
 - Action as per rule during redevelopment.
- **Implementing Agency:** RAJUK, City Corporations.

e. Urban Design Application

OBJECTIVE-UD 14: TO ENSURE A CONVENIENT AND ENJOYABLE ENVIRONMENT OF PUBLIC REALM

To have a desired pattern of urban development to make a city's life convenient and enjoyable there should be some guidelines to be followed during urban development.

Policy-UD/14.1: Formulate Urban Design Guidelines Ensuring a Convenient and Enjoyable Environment of Public Realm

- **Strategic Action:**
 - Policy decision, formulation of guidelines and framework legalization under Town improvement Act 1953.
- **Implementation Tools:**
 - Prepare detailed guidelines at the level of Detail Area Plan (DAP)
 - Form a special body to regulate planning and design of the city and maintain coordination with all related departments.
 - Implement the urban design guidelines under for the whole of RAJUK area with particular reference to the core city and other urban centers.
- **Implementing Agency:** RAJUK, Directorate of Architecture, BNBC.

Policy-UD/14.2: Formulate an Urban Design Framework for RAJUK Area to Ensure Public Safety and Health

- **Strategic Action:**
 - Policy decision, formulation of urban design framework legalization under Town improvement Act 1953.
- **Implementation Tools:**
 - Prepare detailed urban design framework at the level of Detail Area Plan (DAP).
 - Form a special body to regulate planning and design of the city and maintain coordination with all related departments.
 - Follow urban design framework during future development initiative for the whole of RAJUK area with particular reference to the core city and other urban centers.
- **Implementing Agency:** RAJUK, Directorate of Architecture, BNBC.

CHAPTER 13
**PLAN IMPLEMENTATION
AND GOVERNANCE**



CHAPTER 13

GOVERNANCE AND INSTITUTIONAL DEVELOPMENT OF DHAKA

13.1 Introduction

Urban governance is a system that individuals and institutions, whether public or private, plan and follow to manage the common affairs of a city. These days the management of megacities becomes more difficult as they are made up of multiple levels of governments and development agencies. Integration and coordination of planning, inclusive development, institutional finance and enforcement of laws and regulations between levels of government and public utility agencies are the crucial problems faced by the mega cities.

The major impact of any development plan mainly depends on its effective implementation. In addition to sincere commitment, effective implementation of any plan requires proper institutional arrangement, requisite capacities of concerned institutions and individuals viz-a-viz the good governance in place at local level. It also includes formal institutions as well as informal arrangements and the social capital of city dwellers. In operational level urban governance is not merely the function of any particular organization/ institution alone, rather it is the function of a complex combination of many organizations/ institutions like public, private, civil society, community and also now a day's international development partners. All these different types of organizations and institutions have their roles to play in planning, implementation and monitoring of all activities within the urban area which in turn contribute in establishing functional, efficient and progressive urban governance system. In ideal term governance is not an activity rather it is a coordinated process exist among the concerned agencies involved in making and implementing decisions in a participatory manner. This particular chapter of the RDP strategic plan will deal with the issues related to current institutional arrangements and their weaknesses which are indeed affecting to promote a good governance process in the Metropolitan area including exploring potential way forward in order to improve the current situation. It was claimed in many studies that poor governance is one of the main reasons for creating Dhaka City as one of the worst cities in the world.

13.2 Scenario Analysis

The major limitations and weaknesses of most of the institutions involved in Dhaka City development and management can be summarized in the following points:

- Crisis of pro-people leaderships.
- Limited resource-based and weak accountability.
- Lack of autonomy and decision- making powers to influence development decisions in accordance with the local needs.
- Immense fragmentation and lack of consultation among different institutions leading to inefficient and haphazard development initiatives.
- Ill- equipped to respond to powerful lobby groups like, real estate developers and political parties who colonize the urban space at the cost of compromising larger public interests.
- Limited interactions with other social and community forces.
- Limited institutional capacities to pursue a long- term inclusive development process based on local needs.
- No initiatives to provide collective efforts in order to pursue a multi-sectoral development process based on the needs of the city dwellers.

Good urban governance demands attention to a number of key factors like participation, transparency, accountability, responsiveness, authority, rule of law, decentralization, coordination, efficiency and leadership.

The limitations and weaknesses mentioned above are somehow directly affecting the process to promote a good governance system in Dhaka city. As a result Dhaka is now experiencing a weakened decentralized governance system in the context of pervasive and organized patronage based partisan politics which penetrates right down to the bottom level.

As a consequence of the above situation, a patronage system in the form of informal institutions and personalized channels of access to local power positions, livelihoods services and urban land is well organized and powerful. This politically motivated patronage system produces short term positive outcomes or is at times blatantly opportunistic and narrowly aimed at private gains of a few.

The city dwellers are well familiar with this scenario but it is a crucial reminder of how governance in the city actually works through personalized channels and how in one way or another, these relations feed into the larger framework of partisan based politics. Political parties ensure that right down to the ward level, to the neighborhood in which one lives, party activists are able to control power relations such that support for the party in power is maintained and allocation for local development resources are controlled to the extent that those involved extract rent from their position in a hierarchical order. While such behavior can be constructed as corruption and rent-seeking, it is also the way the city is politically managed and governed.

The local government institutions and the public institutions involved in planning and management of the city have very limited capacities and autonomy to make decisions independently because of the fact that they are subject to and part of this very well integrated and systematically managed political framework.

13.3 Critical Issues

- The current role of RAJUK in urban planning includes being a service provider as well as regulator of the development process. Due to this diversified role, RAJUK is not in a position to accomplish its tasks in an effective manner consistence with the demand of the situation. So it is now a pressing issue to redefine the institutional role of RAJUK in city development.
- The belongingness of most policy level officials of RAJUK is not strong enough to pursue any long term vision as they have not been developed within the institutional framework of RAJUK and also they are involved only on short term basis. It is very difficult for them to go for any significant changes although some have demonstrated their capabilities.
- RAJUK has many bright young professionals who can really contribute in focusing RAJUK as “people-centered” institution but they do not find any attraction for continuation in RAJUK due to poor or no professional incentives.
- The current institutional arrangements of RAJUK with local government bodies in RAJUK area are very unclear and sometimes conflicting, which indeed have impact on overall planning and management of the City. This situation has been created due to unclear line of responsibilities for respective institution.

- It has been observed that there is no ownership of DMDP/ Strategic Plan other than RAJUK although many components have been included in the plan and sectoral interventions are required to implement the plan. So justification of developing an inclusive plan by a single institution without the active participation of other stakeholders is at stake.
- It has been evident over the periods that everybody is doing everything in this city without having any effective coordination and many suggestions have been documented in many plans but unfortunately no effective efforts have yet been made in this regard to promote a coordinated process.
- Capacity development is a process rather than one time shoot and needs to be at individual, institutional and societal levels in any institution but this process is not very active in RAJUK. The process should include among other things individual skill development, management style and culture including interaction with other concerned stakeholders.
- The institutions involved in Dhaka City development does not have any effective monitoring and evaluation measures to back-check the implementation phase of their services. Independent and effective monitoring is an important tool for both to provide ground feedback to management on the implementation strategy as well as to ensure accountability. The capacity building of those institutions in monitoring and evaluation frameworks and practices is critical in this regard.
- There are some overlapping functions among different organizations like both RAJUK and City Corporations are developing plans for their respective areas and both DCC and Dhaka WASA provide water supply to the Dhaka metropolis. At the same time multiple bodies working under different line ministries make it difficult to coordinate with each other, resulting in inefficiency, delay in work completion and mismanagement of resources.
- There are limited scopes for the community to get involved in the process of Plan preparation. Developing strategic plan always demand a bottom-up participatory approach in order to make the plan more realistic and demand-driven instead of a supply-driven.

13.4 Main Goal of Institutional Strengthening

- Creating a multi stakeholder institutional setup with required power to function democratically in a coordinated manner that can manage/handle the challenges and issues of future Dhaka City.
- In the short run, RAJUK, as a premier institution of Planning and development, to be reorganized and strengthened with capacity to perform its mandates. In the long run, it is to be developed as a broad based democratic institution to perform the responsibility of a Metropolitan Government.
- Local Governments' within RAJUK area is to be substantially strengthened in respect of rendering their planning and development control functions. At the same time, a coordinated and mutually inclusive relationship to be established between RAJUK and Local Governments.

Other agencies within the jurisdiction of DMR (like WASA, DESA, Metro police and so on) should follow the strategic and local level planning guidelines in their activities and services; and maintain high level coordination with Planning and local authorities. Especially, DTCA, while planning transportation systems of the city must coordinate with planning authority and the local authorities, so that land use and transportation system can be balanced and harmonized.

13.5 Recommended Policies

The five strategic goals as outlined above have been directed to improve the overall situation of current planning and governance system of Dhaka where RAJUK plays the key role. These goals need to be elaborated further in order to provide clear policies that can be translated at ground level. The following short term and long term policies have been set to attain the goals.

a. Capacity Enhancement of RAJUK: Short term

- RAJUK must follow the general principles of modern democratic good governance.
- Restructure/reorganize/setup RAJUK in a manner so that it can carry out its mandates with efficiency and successfully produce plans and can facilitate their implementation.
- Strengthen RAJUK's capacity for successful enforcement of laws and regulations delegated to RAJUK.

b. Capacity Enhancement of RAJUK: Long Term

- RAJUK to be reorganized into two interrelated wings: a) planning and enforcement wing, b) development and enforcement wing under one Board and under the same Ministry with full autonomous status.
- The planning wing of RAJUK will undertake Strategic Planning, Structure Planning, and Regional Planning within its jurisdictions.
- RAJUK will also make Detailed Area Plan/local level plans within its jurisdiction.
- For development control within its jurisdiction, RAJUK will be in charge.
- The development wing will implement all plans and carry out all kinds of infrastructure development.
- RAJUK may be responsible for implementing innovative techniques of land development such as land readjustment, land sharing and land consolidation for major development activities.
- RAJUK to be responsible to upgrading, site and services schemes for low income people.

c. The Local Governments and their Roles

- The City Corporations and Pourashavas within RAJUK area may prepare Action Area Plan under the framework and guidelines provided by RAJUK upper level plans. If the City Corporations and Pourashavas have no capacity, RAJUK will undertake the responsibility to prepare plans for those areas.
- Local Governments (City Corporations, Municipalities and Unions) to be made pro-active so that these important institutions can initiate, innovate and coordinate functions of their own and also can collaborate with others. Substantial capacity building is necessary to perform their mandated functions.
- Sharing responsibility between RAJUK and Local Governments.
- High level coordination is necessary among all service providing agencies, especially, between RAJUK and Local Governments.
- Local Governments' decision making and financial capacity should be strengthened.

13.6 Proposals for Improving General Urban Governance

There are different types of institutional arrangements used to manage the development and operations of mega cities. The most common ones involve Metropolitan Development Authorities like Delhi Capital Region Development Corporation and Metro Manila Development Corporation. Many of the functions of Development Authorities have become privatised. Whatever may be the style, some common principles of governance should be followed by the authorities.

Thus, for effective governance the following principles should be strictly followed:

- a. **Decentralization:** Local/city authorities should enjoy real autonomy to solve local problems. For financing development activities and resource mobilization local authorities are now dependent on the central government. Such dependency should be reduced drastically. For effective urban governance, decision making opportunities have to be developed to the local level (ward and neighborhood level, if necessary). The central government employees assigned to the local bodies have to be placed under the administrative discipline of the local authorities.
- b. **Democratic Practice:** Democratic participation of the stakeholders in decision making and urban development activities is one of the crucial components of good urban governance. In more concrete terms, the authorities should be governed through an active participation of elected representatives.

The urban local governments, the City Corporations have the system of being governed by the elected persons, however, the development authority RAJUK, does not have such system. RAJUK can improve the quality of governance by involving the civil society. Civil society may help mobilize public opinion to more clearly articulate an effective demand on public agency such as RAJUK to formulate urban development plans with adequate transparency.

- c. **Transparency and Accountability:** Transparency assumes that the government's decisions whether routine or policy, and activities affecting citizens, must be transparent to them. There is effectively no devolution of decision making to the people. Accountability, on the other hand, means that public officials, elected or appointed, should be held accountable to the citizens. At present there is hardly any accountability and transparency in the system of City governance. The authority follows a bureaucratic system of decision making. Instead, the authority should actively seek to involve the people in the decision making, implementation and monitoring process development activities. This is not only RAJUK; the other bodies including the City Corporations must follow the principles of accountability and transparency.
- d. **Control and Leadership:** The authority (RAJUK and other local bodies) must have power to control development affairs. At the same time a vision for the development of a modern, dynamic and sustainable city. Excessive power and politicization of the authority may be counterproductive.
The authority must have the power to select its own employees, undertake and implement plans, mobilize resources and provide services to the citizens.
- e. **Rule of Law:** Rule of law means rationale implementation of rules and regulations relating to city development. It is also important that the authority abide by the rules of law and observes its own regulations before it enforces rules of law on others.
It should be noted that pressure from the elites or from the higher authorities to evade law or even violate the law should be resisted.

- f. Manpower and Efficiency:** Efficient urban governance by the authority is not possible without efficient and better trained manpower. It is common in Bangladesh that the institutions lack capabilities to undertake and successfully complete the projects.

One of the reasons for such weakness is the lack of trained manpower available to the authority. Most of the authorities were found under staff. In practice, urban development activities should be technically sound and more balanced to respond to the demands and requirement of all citizens.

A cadre of trained professionals is required within the urban governance and management who are equipped to manage these local entities.

- g. Coordination:** The most critical problem in the governance of Dhaka is the weak or even non-existent of coordination among the development partners. There are more than 16 government/autonomous organizations directly involved and nearly 30 other organizations indirectly involved in urban development activities in Dhaka.

Despite having an institutional arrangement among the first 16 organizations real coordination has not yet been possible. There remains a dilemma that who coordinates with whom and how. Particularly, the coordination between RAJUK and City Corporations is crucial, which has been bogged down due to fact that City Corporations are important in terms of power and importance as their heads are having a status of Ministers and they are the people's representatives, while the development authority administers a much bigger area than those controlled by City Corporations. As a result coordination between these two important organizations remains as problematic as ever. We recommend that RAJUK should take the lead and the Corporations come forward to help RAJUK have an effective coordination.

The seven general recommendations indicated above for desired governance of Dhaka are necessary to maintain, but implementation of such recommendations need institutional reforms and capacity building of the respective institution.

It is particularly necessary to strengthen the capacity of the authority and local governments. To this end, an efficient and dedicated work force is to be created. Preference should be given to quality rather than quantity. Restructuring and reforms of the institutions would be necessary to accomplish the recommendations effectively. Qualitative changes in the operations of day to day activities are necessary. (Dhaka WASA has the experience of institutional reform, which can be an example, but may not be sufficient). It is also necessary to reform acts and regulations for effective good governance through above mentioned indicators.

Finally, strong private sector involvement is needed to improve governance and promote urban development activities. To form partnership with private sector, adequate institutional arrangements and reform would be necessary to facilitate development activities through partnership.

13.7 Institutional Strengthening of RAJUK

Not only for implementation of all Dhaka plans, the institutional strengthening of RAJUK is also necessary for long term development of Dhaka mega city and makes it as a city of international status. Such development can be approached in two ways: short run and long run. Short run improvement will help RAJUK undertake actions immediately. Long term measures can be developed in the line with Bangladesh's development goals under vision 2021 and to face the challenges of Dhaka to become a global city with characteristics of economically productive, socially inclusive and environmentally sustainable.

a. Short Run Measures

Upgrading of its status by upgrading the status of its Board and the position of its Chairman along with the heads of all Divisions are necessary. Secondly, strengthening of decision making capacity and financial autonomy are recommended. Third, substantial organizational development is required. Fourth, substantial capacity building of staff is necessary through education and training measures.

Appropriate measures are necessary to be taken to regain RAJUK's public image. At present RAJUK is suffering from an image crisis. To this end, transparency and accountability of its activities are to be strengthened substantially. RAJUK should enhance the level of participation of various stakeholders in its activities may also help regain its status. It is an utmost necessity to rebuild confidence and trust in RAJUK.

Measures are to be taken to improve the level of coordination among key agencies and actors in Dhaka's development. Particularly those involved in land use, transportation, economic planning, large project identification and implementation, budgeting and much closer integration of these activities with environmental management.

The most crucial is the sharing the activities with local government within the RAJUK's jurisdiction. The following are the specific proposals for strengthening RAJUK:

- Stronger and more effective management structure with greater delegation to senior management.
- Board members should be selected from RAJUK's own staffs who have relevant knowledge, experience and expertise. In this regard TI Act should be revised;
- Preparation of a full corporate plan and annual business plan to reflect the imminent restructuring of RAJUK.
- Increased autonomy in decision making process with respect to: i) reduce improper involvement in land development decisions, ii) recruitment of human resources for RAJUK, iii) general operational decisions.
- Increase financial autonomy to both raise and spend its income through the following:
 - Sales of residential plots through auction, or at a higher price than cost price.
 - Fines for planning contraventions and
 - Developers' contributions for infrastructure development (impact fee)
- Create a research unit within RAJUK to conduct research and to include monitoring of planning applications, land values, land development trends and financial planning.
- Create training facilities for all staff, phase by phase, to enhance capacity.
- Create a strong planning wing /Department within RAJUK with sufficient number of planners and support staff.

b. Long Run Measures

RAJUK can be turned into a **Metropolitan Development Authority** with capabilities of undertaking full range of strategic land use, transportation, economic and environmental planning and management. The local level planning functions can then be delegated to the local authority. Environmental management and transportation is the domain of other institutions. RAJUK is dealing with land use planning and development control and provides limited housing and commercial facilities to the richer section of the people. This seems apparently problematic as it does not fulfill the needs of the people and the dream of a livable city.

Unless RAJUK becomes more transparent and accountable it will be unable to regain the trust of the general citizens. Moreover, RAJUK is to be given more authority and autonomy over its decision making and financial power.

The Board membership is to be increased by the addition of a representative from each of Local Government, DTCA, LGED, UDD and private sector, and civil society. This would provide a reasonably compact board structure conducive to rapid decision making. Outside members will rotate every two years.

To increase public awareness and transparency RAJUK should be under a statutory obligation to produce and publish a full informative annual report and accounts. The chairman RAJUK should hold regular press conference to explain what RAJUK is doing and answer questions on same. RAJUK should also hold an annual conference with coalitions of organizations concerned with urban development in Dhaka.

13.8 Plan Dissemination, Monitoring and Review

13.8.1 Plan Dissemination

The Structure Plan should be reached to all its stakeholders for their knowledge and for guidance and reference in drawing up their respective development plans, programmes and projects within RAJUK area. Copies of the report and maps should be officially sent to all the stakeholder agencies after official gazette notification of the plan approval.

13.8.2 Monitoring of and Evaluation of Structure Plan Implementation

RAJUK, as the custodian of the Structure Plan, is responsible to oversee implementation of its policy proposals. The planning department should regularly monitor execution of the Structure Plan policy proposal implementation and submit monthly report to the Chairman. Apart from its own initiatives, RAJUK should also pursue other government agencies in writing, to follow the policy proposals during their project formulation. An implementation evaluation report should be prepared at the end every year and take necessary actions for execution of the policies

13.8.3 Duration and Review of Structure Plan

The current Structure Plan shall remain valid for a period of 20 years 2016- 2035. **Structure Plan should be systematically reviewed and updated every five year, with the reviewing taking place at least one year before the end of each five year period.** In order to keep the Structure Plan relevant during its lifetime, when change is likely to be rapid and often unpredictable, it is recommended that there be a mandatory requirement for Structure Plan updating. On every 4th year a revision of the Structure Plan should be carried out proceeded by an evaluation report.

13.9 Recommendations to Address Sectoral Issues

RAJUK is not the only organization in Dhaka to solve all its problems, nor can the planning functions of RAJUK solve all of Dhaka problems. There are problems and issues like economic planning development, environmental planning management, transportation planning and management in addition to RAJUK's own domain of urban land use planning and control functions.

a. Economic Development Issues

Dhaka alone contributes over 36% to the national GDP. This is an engine of national growth. However, such potentials are under threat due to lack of economic planning. There is no authority to look after the economic planning of Dhaka, nor does RAJUK deal with the economic issues. There is little reliable data on the economic characteristics of the city. Thus, Dhaka's economic competitiveness is decreasing and this will be a challenge for Dhaka to compete with other global cities. The following measures can be promoted to arrest the problem:

- Establish a regional economic development committee for DMR with government, academic and private sector members to provide an ongoing forum to provide policies for economic growth and troubleshoot problems as they arise.
- Give priority in locating industry and business as long as they do not pollute environment. Prepare an economic development plan to provide the basis for shaping the form and location of investment within DMR area including setting up economic zone.
- RAJUK to support program activities that will facilitate development of economic cluster for key industries such as garments, leather, logistics, and knowledge industries for example.
- Create a one stop economic service office for the entrepreneurs and investors of DMR to provide advice and to facilitate necessary permits.
- Compile data on economic indicators and forecast spatial development trends and land and rental value in DMR.
- Establish website for these kind of information.

b. Transportation Issue

Dhaka is expanding and a city with population of 15+ million now, requires proper mass transit system to navigate within the city for daily activities. The transportation network of Dhaka requires dynamic planning as new transport links are planned by different line agencies (RHD, LGED, DTCA, DCC, RAJUK) that lacks coordination. With the introduction of railway overpass, grade-separated intersections, proposed BRT/MRT/Expressways, a need for separate "Institute of Transportation" has emerged.

At the beginning, the primary focus of the Institute will be to prepare comprehensive network analysis of Dhaka in context of city traffic and regional connectivity. This Institute can analyze results of proposed transport links (roads, bridges, rail, waterways etc.) to guide the investment of different transport agencies. The comprehensive network will also include existing land use and traffic volume data of RAJUK area, and will be updated periodically to assess the future requirements of transport network.

There are already few transport network models prepared under different projects using different modeling software such as: EMME/2 under STP, STRADA under DHUTS, and TransCAD under BRT project once the project is completed the models are seldom used for future projects. With the functioning of Transportation Institute, the model will be properly maintained and updated/calibrated/recalibrated to be available for future planning. Eventually this Institute can become a National Organization for Transportation research and planning.

c. Environmental Management and Planning

The poor environmental planning and management is one of the main reasons why Dhaka's environment is fast deteriorating. Water pollution caused biological death of rivers, filling of rivers and wetland cause flooding, air pollution and formation of slum cause poor living conditions. RAJUK has little concern about environmental planning at the moment. On the other hand, DOE is primarily concerned with over all policy, environmental monitoring and pollution control measures. If the situation is to be reversed, environmental planning and management issues need to be mainstreamed into RAJUK's operations. The following recommendations can be made to environmental management in DMR:

- Ensuring compliance with existing environmental laws and regulations.
- Mainstreaming the environmental issues in plan preparation and plan implementation process.
- Develop knowledge base for environmental planning and management through education, research and training.
- Awareness building program can be promoted among general people.
- RAJUK and DOE can develop a joint approach to enforcement with Deputy Commissioners and BWDB.

d. Urban Planning

Dhaka's urban planning system has changed little in the last 50 years. Unlike many other countries in the region, the system has not evolved in Bangladesh to address the emerging urban management challenges or incorporate new thinking on and approaches to metropolitan planning. Unless these challenges are accepted, understood, and addressed, setting metropolitan Dhaka for the 21st century with sustainable development is likely to be difficult, if not impossible. Thus, strengthening the planning system is crucial for achieving the ways for more sustainable development. Planning needs to become more flexible, more geared to facilitate implementation through active planning and have a stronger compliance system.

Plan preparation should concentrate on key issues identified at the outset (study phase) which should be studied in detail for the type or the nature of plan being produced. Plan preparation should be phased out on the basis of priority development area. It is also necessary to ensure land use proposals are designed to take account of the major infrastructure development of the city. RAJUK should follow a proactive planning system to manage rapid urbanization of Dhaka.

For example, it should identify special development areas (major growth areas, areas subject to high development, new transport, industrial or commercial hubs, slum upgrading areas, etc.) for immediate planning. Slow areas can wait a little bit. Innovative approach for land development should be introduced.

The world wide trend is to plan more democratically through increased public participation and consultation procedure. Provision for more widely publicity of plans prepared will stimulate people to make their views and comments and possible contribution.

e. Promote Participatory Planning and Development

RAJUK should be sensitive to people's needs and go for people's participation in planning and development activities. Public hearing should be made more effective and fruitful. It should restore other methods of participation, like, **dialogue** sessions, meetings and exhibitions. Improve partnerships, networking and cooperation must be developed with all the stakeholders to

implement plans, programmes and projects. The partnerships create a sense of community responsibility and belongingness through involvement that make development more people oriented.

f. Undertake PPP Projects

RAJUK should evolve and undertake PPP projects to reduce dependency on public resources which is scanty in supply and very much competitive. Restoring to more to PPP projects will enable RAJUK undertake more infrastructure development projects and cause quicker development spending less public money. Guided land development, land readjustment techniques and betterment charge on land owners around a newly developed infrastructure are common PPP projects.

g. Create a Metropolitan Development Authority

It is true that Dhaka's future development has to be guided more effectively by an appropriate authority that is democratic and strong enough to capture problems facing by the contemporary Dhaka. This can realistically be done if transportation plans and projects are prepared and implemented in accordance with land use policies. Likewise, land use plans need to be formulated within a context of sound environmental planning simultaneously addressing the needs of Dhaka's economy. Similar levels of integration are required for plan implementation though development control and pro-active planning.

The absence of required levels of integration and inter-agency coordination is a major contributory factor to the problems that Dhaka is now facing. If Dhaka's future development is become more sustainable mechanism and institutional structure have to be changed to ensure that this integration take place.

Most of the cities in developed country, and many in the developing countries have or moving towards combining metropolitan planning and development functions under a single authority. Core to this reform is a **Metropolitan Development Authority (MDA)** which will have overall responsibility for the planning and coordination of all metropolitan level development activities.

There seems to be no reason why Dhaka should not have such an authority. It is the capital City, a megacity which continues to grow fast. It is the economic hub of the country and many of its current problems need metropolitan solution. Such Metropolitan Development Authority is very much consistent with Bangladesh's Vision 2021.

h. Enactment of a Comprehensive Territorial Development Planning Law

First and foremost, Dhaka, or Bangladesh as a whole for that matter, needs well-structured planning legislations to back up and coordinate all the planning activities incurring throughout the country. Indeed, much of the problems and confusions which led to chaotic conditions of urban development and management are rooted from here. Town Improvement Act '53 which now acts as the backbone of urban planning in Bangladesh is grossly outdated and not thorough enough, and a few other sporadic piecemeal regulations are often too technical without clear direction. Further, a proper and clear assignment of functions and role differentiation among the different levels of government and other entities is largely missing and makes the situation even more embarrassing.

Therefore, a complete overhaul and setting up of a robust planning system is urgently needed

based on solid foundation of planning laws and regulations encompassing all necessary aspects of planning. Lack of big picture like national and district-level regional plans poses another serious limitation in plan making of individual cities, as those upper level plans set the tone and directives to be followed by lower level plans. Also in many sectors of planning, such as transportation or environment, critical issues and projects sometimes traverse beyond the territorial boundaries of individual local governments. Thus it becomes important to check consistency from a broader perspective on the regional or national level. A comprehensive planning law that covers all the respective responsibilities and functions of the plans by different levels of government is therefore essential.

i. Institutional Arrangement Required for Implementing the Plan

In reviewing the implementation status of previous DMDP, it has been observed that the plan could not be implemented due to two main reasons, like lack of ownership from the part of urban development institutions other than RAJUK and absence of proper efforts in implementing the plan. So keeping these in mind, RDP made efforts to promote a participatory process involving the main stakeholders in the process of plan preparation and duly solicited their concerns and suggestions within the constraints of time and resources. As the plan has been prepared by RAJUK so it is the custodian of this plan and it has to make necessary efforts in implementing this plan. RAJUK should perform the following activities towards implementing the Structure Plan:

- After finalizing the plan RAJUK should organize an orientation meeting involving all institutions (public, private, LGs and community) working in Dhaka urban development to sensitize them on all aspects of this plan.
- It has been observed that apart from this strategic plan, the stakeholder agencies have their own plans for DMDP area. RAJUK should convince those agencies so that they can develop their own plan on the basis of this strategic plan in order to avoid duplication.
- On the basis of this strategic plan RAJUK should develop an action plan in consultation with concerned agencies specifying role, responsibility and timeframe required for implementation of this plan.
- In an ideal situation local level planning and development should be managed by respective local government institutions. In the initial stage RAJUK should play an important role to develop their capacities in developing need-based plan for local area.
- The mandate of RAJUK and local government institutions for local level planning and development should be specific in order to avoid duplication or any possible confrontation.
- The official mandate of RAJUK should be reviewed in accordance with their institutional capacity and the existing socio- political situation of the country.
- Within the City Government under the leadership of an elected representative, RAJUK can contribute significantly in looking after all planning activities related to DMDP area. In absence of the City Government, RAJUK can play the role of Coordinator, for coordinating all activities within DMDP area.
- For all sectoral activities proposed in the strategic plan should be implemented by respective sectoral agency in accordance with the action plan to be prepared by involving all institutions.

An aerial photograph of a city grid, likely Dhaka, Bangladesh, viewed from an elevated perspective. The image is heavily stylized with a dark blue overlay, making the buildings and streets appear as a textured, monochromatic pattern. The grid lines are clearly visible, and the overall composition is centered around the city's layout.

ANNEXURE

ACRONYMS & ABBREVIATION

AA	Agriculture Area
ADB	Asian Development Bank
ADP	Annual Development Plan
AQMP	Air Quality Management Plan
ARI	Accident Research Institute
BAPA	Bangladesh Poribesh Aandolon
BARI	Bangladesh Agricultural Research Institute
BBS	Bangladesh Bureau of Statistics
BC Rules	Building Construction Rules
BCAS	Bangladesh Centre for Advanced Studies
BELA	Bangladesh Environmental Lawyers Association
BEPZA	Bangladesh Export Processing Zone Authority
BES	Bangladesh Earthquake Society
BEZA	Bangladesh Economic Zones Authority
BGB	Border Guard Bangladesh
BGMEA	Bangladesh Garment Manufactures & Exporters Association
BIWTA	Bangladesh Inland Water Transport Authority
BLDA	Bangladesh Land Developers Association
BNBC	Bangladesh National Building Code
BOU	Bangladesh Open University
BR	Bangladesh Railway
BRT	Bus Rapid Transit
BRTA	Bangladesh Road Transport Authority
BRTC	Bangladesh Road Transport Corporation
BSMRAU	Bangabandhu Sheikh Mujibur Rahman Agriculture University
BTCL	Bangladesh Telecommunications Company Ltd
BUET	Bangladesh University of Engineering & Technology
BWDB	Bangladesh Water Development Board
BWDB	Bangladesh Water Development Board
CA	Conservation Area
CAAB	Civil Aviation Authority Bangladesh
CBD	Central Business District
CBOs	Community Based Organizations
CERDI	Central Extension Resources Development Institute
CES	Center for Enterprise and Society
CIA	Central Intelligence Agency
CMP	Community Mortgage Programme
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO2	Carbon Dioxide
CPA	Certified Public Accountant
CRDP	City Region Development Project
CUA	Central Urban Area

CUS	Centre for Urban Studies
D.I.T	Dhaka Improvement Trust
DAP	Detailed Area Plan
DCC	Dhaka City Corporation
DRRR	Disaster Risk Reduction Regulation
DEM	Digital Elevation Model
DEPZ	Dhaka Export Processing Zone
DESCO	Dhaka Electricity Supply Company
DHUTS	Dhaka Urban Transport Network Development Study
DIFPP	Dhaka Integrated Flood Protection Project
DMA	Dhaka Metropolitan Area
DMAIUDP	Dhaka Metropolitan Area Integrated Urban Development Project
DMDP	Dhaka Metropolitan Development Plan
DNCC	Dhaka North City Corporation
DND Triangle	Dhaka-Narayanganj-Demra Triangle
DO	Dissolved Oxygen
DoE	Department of Environment
DOHS	Defense Officers Housing Society
DPDCL	Dhaka Power Distribution Company Limited
DPHE	Department of Public Health Engineering
DSCC	Dhaka South City Corporation
DTCA	Dhaka Transport Coordination Authority
DUET	Dhaka University of Engineering and Technology
DWASA	Dhaka Water Supply and Sewerage Authority
ECA	Environmentally Critical Area
EIA	Environmental Impact Assessment
EMR	Extended Metropolitan Region
EPZ	Export Processing Zone
ESA	Environmentally Sensitive Areas
ETP	Effluent Treatment Plant
FAP	Flood Action Plan
FAR	Floor Area Ratio
FCDI	Flood Control, Drainage and Irrigation
FDI	Foreign Direct Investment
GCC	Gazipur City Corporation
GDP	Gross Domestic Product
GHG	Green House Gas
GLD	Guided Land Development
GMA	Growth Management Area
GoB	Government of Bangladesh
GSB	Geological Survey of Bangladesh
HBB	Herring-Bone-Bond
HBFC	House Building Finance Corporation
HBRI	Housing and Building Research Institute
ICD	Inland Container Depot
ICT	Information & Communications Technology

IDCOL	Infrastructure Development Company Limited
ILDI	Infrastructure Led Development Initiatives
ISW	Industrial Solid Waste
IT	Information Technology
ITS	Intelligent Transport Systems
IWM	Institute of Water Modelling
JICA	Japan International Cooperation Agency
KPI	Key Point Installation
LFS	Labour Force Statistics
LG	Local Government
LGED	Local Government Engineering Department
LGRD	Local Government and Rural Development
LGU	Local Government. Units
LNG	Liquefied Natural Gas
LQ	Location Quotient
LR	Land Readjustment
MDA	Metropolitan Development Authority
MDG	Millennium Development Goal
MDR	Marketable Development Right
MGC	Maximum Ground Coverage
MLD	Million Litres per Day
MoE	Ministry of Education
MoPME	Ministry of Primary and Mass Education
MORTB	Ministry of Road Transport and Bridge
MOU	Memorandum of Understanding
MRT	Mass Rapid Transit
MSW	Municipal Solid Waste
NBR.	National Board of Revenue
NCC	Narayanganj City Corporation
NCR	North Central (Hydrologic) Region
NDC	Neighborhood Development Concept
NGO	Non Government Organization
NHA	National Housing Authority
NMT	Non Motorized Transport
NOC	No Objection Certificate
NUDS	National Urban Decentralization Strategy
O&M	Operation and Management
OUA	Outer Urban Area
PDB	Power Development Board
PGA	Peak Ground Acceleration
PRLDR	Private Residential Land Development Rule
PM	Particulate Matter
POD	Pedestrian Oriented Development
pph	Population Per Hectare
PPP	Public Private Partnership
PPRC	Power and Participation Research Centre

PSTP	Pagla Sewage Treatment Plant
PTW	Production Tubewells
PUD	Planned Unit Development
PWD	Public Works Department
RAJUK	Rajdhani Unnayan Kartripakkha
RDP	Regional Development Planning
REB	Rural Electrification Board
REHAB	Real Estate and Housing Association of Bangladesh
RHD	Roads and Highways Department
ROW	Right of Way
RP	Regional Plan
RS	Revised Survey
RTTA	Road Transport and Traffic Act
SAARC	South Asian Association of Regional Cooperation
SCA	Seed Certification Agency
SCOOT	Split Cycle Offset Optimization Technique
SFYP	Sixth Five Year Plan
SMA	Statistical Metropolitan Area
SMEF	Small and Medium Sized Enterprises Foundation
SOV	Single-occupant Vehicles
SPM	Suspended Particulate Matter
SPZ	Spatial Planning Zone
Sq. Km	Square Kilometer
STP	Strategic Transport Plan
SWOT	Strength Weakness Opportunity and Threat
TDM	Travel Demand Management
TDRs	Transfer of Development Rights
TEUs	Twenty-foot Equivalent Units
TGDTC	Titas Gas Transmission and Distribution Company
TI Act	Town Improvement Act
TIA	Traffic Impact Assessment
TOD	Transit-Oriented Development
TWG	Total Waste Generation
UAP	Urban Area Plan
UCZ	Urbanization Control Zone
UDD	Urban Development Directorate
UNCHS	United Nations Centre for Human Settlements
UNDP	United Nations Development Programme
UPFG	Urban and Peri-urban Forestry and Greening
URP	Urban and Regional Planning
USA	United States of America
WASA	Water Supply & Sewerage Authority
WB	World Bank
WHO	World Health Organization

TERMS AND MEASUREMENTS

1 Lakh	100,000
1 Million	1,000,000
1 Crore	10,000,000
1 Katha	66.9 Square Meters/720 Square Feet
1 Bigha	20 Katha/1338 Square Meters
1 Hectare	2.47 Acres/7.5 Bigha/150 Katha/10,000 Square Meters
1 Acre	3 Bigha/60 Katha/4048 Square Meters
1 Meter	3.28 Feet
1 Square Kilometer	100 Hectares/247 Acres
1 Square Mile	2.59 Square Kilometer

Annex-1.1: List of RS Mouza's of Extended Area of Gazipur City Corporation and Dhamsona Union

SI No	DIVISION NAME	DISTRICT NAME	THANA NAME	MAUZA NAME	JL NO
1	Dhaka	Gazipur	GazipurSadar	Arisa Prasad	18
2	Dhaka	Gazipur	GazipurSadar	Bagia	52
3	Dhaka	Gazipur	GazipurSadar	Bahadurpur	17
4	Dhaka	Gazipur	GazipurSadar	Baimail	56
5	Dhaka	Gazipur	GazipurSadar	Banua	22
6	Dhaka	Gazipur	GazipurSadar	Baupara	16
7	Dhaka	Gazipur	GazipurSadar	Bipra Bartha	13
8	Dhaka	Gazipur	GazipurSadar	DakshinBagber	48
9	Dhaka	Gazipur	GazipurSadar	Dakshin Laskarchala	49
10	Dhaka	Gazipur	GazipurSadar	Domnag	30
11	Dhaka	Gazipur	GazipurSadar	Gazar Chap	41
12	Dhaka	Gazipur	GazipurSadar	Gazipur	20
13	Dhaka	Gazipur	GazipurSadar	Hatiaba	19
14	Dhaka	Gazipur	GazipurSadar	JayarTek	55
15	Dhaka	Gazipur	GazipurSadar	Jolar Para	14
16	Dhaka	Gazipur	GazipurSadar	Kayailtia	10
17	Dhaka	Gazipur	GazipurSadar	Khalsa Bartha	11
18	Dhaka	Gazipur	GazipurSadar	Kona Para	42
19	Dhaka	Gazipur	GazipurSadar	Kumarkhada	43
20	Dhaka	Gazipur	GazipurSadar	Lohakair	50
21	Dhaka	Gazipur	GazipurSadar	Madhabpur	44
22	Dhaka	Gazipur	GazipurSadar	Mirpur	51
23	Dhaka	Gazipur	GazipurSadar	Nawara Bartha	12
24	Dhaka	Gazipur	GazipurSadar	Pajulia	21
25	Dhaka	Gazipur	GazipurSadar	PaschimPanisail	37

SI No	DIVISION NAME	DISTRICT NAME	THANA NAME	MAUZA NAME	JL NO
26	Dhaka	Gazipur	GazipurSadar	Pratappur	54
27	Dhaka	Gazipur	GazipurSadar	PurbaKhola Para	53
28	Dhaka	Gazipur	GazipurSadar	Shibrampur	39
29	Dhaka	Gazipur	GazipurSadar	TarafMadhabpur	47
30	Dhaka	Gazipur	GazipurSadar	Tekibari	32
31	Dhaka	Gazipur	GazipurSadar	Uttar Panisail	40
32	Dhaka	Gazipur	GazipurSadar	Uttar Salna	15
33	Dhaka	Dhaka	Savar	Dhamsana	23
34	Dhaka	Dhaka	Savar	ChhotaPachhail	20
35	Dhaka	Dhaka	Savar	Dehara	26
36	Dhaka	Dhaka	Savar	Deodasa	24
37	Dhaka	Dhaka	Savar	Maijhail	21
38	Dhaka	Dhaka	Savar	Subandi	25
39	Dhaka	Dhaka	Savar	Unail	22

Annex-1.2: Supporting Studies

Apart from preparation of Structure Plan (2016-2035), the Consultant team has drawn upon range of supporting studies presented as Working Papers on different key sectors. The key reports and documents include:

- **Working Paper No. 01 - Population and Migration**

Existing Population distribution, growth trend, population density and its impact, trend of migration and its reasons, future desirable population of Dhaka City Region of 2035 has been presented in this working paper.

- **Working Paper No. 02 - Urban Growth Management & Development Strategy**

The working paper proposed new development corridor (towards north-eastern region) for greater Dhaka and growth management strategies for Dhaka. The strategies include, *inter alia*, translating various global practices into Dhaka context, e.g. TDRs, PUD and so on.

- **Working Paper No. 03 - Land use Planning and Development Control**

The working paper focusing on formulating the strategies for land use zoning and development control at the functional level. Based on the theoretical foundations of land use planning and transportation as well as global and local practices of zoning system, the paper has recommended five types of functional land use zones and revising 'FAR index' respectively for macro and micro level development control.

- **Working Paper No. 04 - Land Management Techniques**

This working paper highlights the techniques used for land development in global context. The intention is to pursue the urban development authority to adopt the techniques to quicken land development through mostly public-private partnership.

- **Working Paper No. 05 - Housing and Neighborhood**

Housing and Neighbourhood working paper critically analyze the problems of urban housing facing in Dhaka. It highlights the critical issues relating to housing including, finance, infrastructure, land value and land. Recommends adoption participatory housing techniques and high density block based development to save valuable urban land.

- **Working Paper No. 06 – Transportation**

Working Paper No. 06 draws upon the present transportation problems facing by greater Dhaka, including, traffic congestion, quality of service, inadequacy of transport, absence of mass transit, etc. It highlights the critical issues and points out the way forward. The proposals include mass transit like, BRT, MRT, new road proposals, service road, ring road, and flyover. Most of these recommendations are incorporated in the previous studies like. STP, DIHUTS and Structure Plan (1995-2015).

- **Working Paper No. 07 – Utility Services: Water supply & Sanitation**

This working paper is concerned about two major utility services- water and sanitation. The working paper analyses the problems and issues of the utility services, forecasts future demand and recommends for meet the future demand.

- **Working Paper No. 08 - Energy: Electricity, Solar Energy & Gas**

The working paper studies the present status of electricity, solar energy and gas supply. It analyses

the problems and issues connected with the above energy sources and finally puts forward recommendations to promote energy conservation.

- **Working Paper No. 09 - Parks and Public Spaces**

In parks and public space working paper, review has been carried out about the present status of open space and future need based on population growth. It highlights the problems of preserving open space and makes recommendations about future open space and their preservation.

- **Working Paper No. 10 - Urban Design, Landscape & Waterfront**

Urban design addresses both the functional and aesthetic aspects of city's built environment. Aesthetics, being the traditional concern of urban design can only be more meaningful when combined with other considerations to generate an environment that is visually pleasant, convenient, and comfortable, which conveys a sense of place, pride and belonging. Urban design activities and efforts will seek to develop a policy framework and guidelines so as to create a desirable living environment and an appropriate city image and identity. Urban forms, urban identity and urban linkages, preservation and treatment of historic sites and water retention areas and river front recreational development etc. have been highlighted in this Working Paper No. 10.

- **Working Paper No. 11 – Economy, Employment and Investment**

Working Paper -11 focuses on the Dhaka's economy, its growth, present status, problems; and opportunities of future growth. The working paper recommends spatial growth of the economic activities including the informal sector, the highest employment provider. It suggests diffusion of activities to smaller urban centres through promotion of effective connectivity.

- **Working Paper No. 12 – Geo-Morphology**

Geomorphological issues cover geological conditions, like, land formation, geomorphic coverage, ground water. The working paper studies the local and regional geomorphology of the RAJUK area. It identifies the areas that are suitable for spatial development and the areas where development should be restricted.

- **Working Paper No. 13 – Urban Disaster Management**

Urban disaster management working paper is about disasters that the Dhaka city is currently and likely to face in the future. The report covers the issues disasters like, flood, wetland loss, earthquake, fire, structural collapse. The report highlights the disasters encountered earlier by the city and possibilities of occurrence in future. The report also puts forward mitigation measures to face the future disasters the city is likely to encounter.

- **Working Paper No. 14 – Sustainable Environmental Framework**

- **Working Paper No. 15 – Flood Control and Drainage**

Under Working Paper-15 studies have been carried out on river system around Dhaka, khal and lake system, storm water and manmade drainage with respect to various RAJUK's regions, drainage and hydrology followed by recommendations to overcome the flood situation in the built part of the city.

- **Working Paper No. 16 – Solid Waste Management**

In this working paper studies have been carried out on the status of present solid waste management, key issues related to solid waste management, inadequate national policy support, lack of land fill space, lack of hazardous waste disposal facility, relation between climate change and municipal waste. Recommendations have been made about integrated solid waste management.

- **Working Paper No. 17 – Legal Aspects of Planning**

Working paper on legal issues reviews different legal documents that have bearing on urban planning

and development. It focuses on the limitations of various legal documents and suggests amendments to make them uptodate to cope with changing conditions.

- **Working Paper No. 18 – Institutional Strengthening & Capacity Building**

Under institutional strengthening the working paper analyses the present institutional set up of RAJUK and its problems in discharging responsibilities of the organization. It suggest reformation of the very structure of the organization making it more people oriented and strong with respect to manpower. Under capacity building recommendations have been made to capacitate RAJUK and its professionals by providing trainings and other forms of activities.

- **Working Paper No. 19 – Plan Implementation & Development Coordination**

The working paper on plan implementation, the most critical part of any planning effort, describes the problems of plan implementation, need to overcome the problems to make it effective to the beneficiaries. The report makes recommendations about measures to get the plan implemented by various agencies. The report also speaks about coordination of planning and development activities by various urban development and service provides agencies within RAJUK area.

ANNEX-1.3: PROJECT TEAM

PROJECT MANAGEMENT	
NAME	DESIGNATION
Md. Sirajul Islam	Project Director
Md. Hasibul Kabir	Project Manager
Md. Ashraful Islam	Project Manager
Shahnawaz Hoque Chandan	Project Manager
Kamrul Hasan Shohag	Project Manager
Mahfuja Aktar	Deputy Town Planner
Mohammad Aminul Quaium	Assistant Town Planner
CONSULTANT	
INTERNATIONAL CONSULTANTS	
NAME	EXPERTISE
Jin Koo, CHO	Team Leader
Lee, Tae-il	Urban Management and Development Control Planning Specialist
Chang Su, RYU	Strategic Transport Specialist
Min Byungha	Capacity Building Specialist / Training Coordinator
Chang, Han Moon	Environmental Planning Specialist
Koh, Seah Bum	Urban Designer / Architect
Shin Dong Wook	Supporting Staff/Mid-Level Urban Planner
NATIONAL CONSULTANTS	
NAME	EXPERTISE
A. S. M. Mahbub-Un-Nabi	Urban and Regional Planning Specialist/DTL-1
Dr. Akhter Hussain Chaudhury	Urban and Regional Planning Specialist/DTL-2
Dr. M Rahmatullah	Strategic Transport Specialist
Mr. Mohiuzzaman Quazi	Strategic Transport Specialist
Dr. Rukunuddin Ahammed	Urban Planner-1
Zeenat Nahreen	Urban Planner-2
Dr. Farida Nilufar	Urban Designer / Architect
Dr. ATM Nurul Amin	Regional Economic Development Specialist
Md. Lutfor Rahman	Hydrologist
Md. Saiful Islam Chowdhury	Hydrologist

NAME	EXPERTISE
Dr.Md.Rezaul Karim	Environmental Planning Specialist
Dr. AKM Nazrul Islam	Environmental Planning Specialist
Dr. Nurul Islam Nazem	Institutional Specialist
Md. Furkan Ahmed	Water Supply and Sanitation Specialist
Dr. Md. Maksudur Rahman	Disaster Management Expert
Dr. Md. Imam Zafor	Disaster Management Expert
Sailendra Chandra Saha	Capacity Building Specialist/Training Coordinator
Md. Nazrul Islam Sarker	Social Development Specialist
Dr. Jahangir Alam	Social Development Specialist
Malik Md. Abdus Samad	Geomorphologic Expert
Md. Lutfur Rahman	GIS Expert
Md. Rafiqul Islam	Survey Expert
Md. Mahmudur Rahman	
SUPPORT STAFF: PROFESSIONALS	
NAME	EXPERTISE
Abu Musa Md. Abdullah	Mid-Level Urban Planner
Mohammad Al-Amin	Mid-Level Urban Planner
Md. Hisham Uddin Chisty	Mid-Level Urban Planner
Atif M. Saadi	Mid-Level Transport Planner
Md. Mahbubur Rahman	Mid-Level Environmental Expert
Mokarram Sohul	Assistant Transport Planner
Faysal Kabir Shuvo	Assistant Urban Planner
Md. Saidur Rahman	Assistant Urban Planner
Gazi Mohammad Shahinur	Assistant GIS Expert
Md Atikul Islam	Assistant GIS Expert
S.S. Biddya Baron Sarker	Assistant GIS Expert
Jannatul Mauya Dalia	Junior Urban Planner
Nuzhat Sharmin Nusha	Junior Architect
Md. Shakhawat Hossen	Junior Urban Planner
Bandhan Dutta Ayon	Junior Urban Planner
Md. Rabiul Awal	Junior Urban Planner
Mrs. Rehana Nesreen	Assistant Sociologist
Md. Towhidul Islam	Assistant Engineer
Mohammed Faisal Zaman	Assistant Engineer

NAME	EXPERTISE
Abdullah Al Baky	Assistant Engineer
Biprojit Paul	Assistant Engineer
SUPPORT STAFF: ADMINISTRATIVE	
NAME	DESIGNATION
Md. Ataur Rahman	Manager Cum Accountant
Md. Mizanur Rahman	Computer Operator
Mohammad Selim	Office Assistant
Md. Mozibur Rahman	Office Boy

Annex 3.1: Centre Hierarchy & Characteristics

SI No.	Name of Centre	Hierarchy Type	Nature	Central Point	Admin. Unit	Proposed Zone in Structure Plan	Walking Catchment (km)	Character/features for Selection
B. Northern Region								
1	Gazipur	Regional Centre	Established	Joydebpur Rail Junction	Gazipur CC	OUA	2	<ul style="list-style-type: none"> • Main urban centre for the Northern region • Old & established settlement • Renewed administrative significance through formation of new City Corporation HQs • Varied employment & commercial base • Wide range of general services • Rail connectivity (Joydebpur Rail Junction) • Proposed BRT/Metro access • Road access by Joydebpur Rd. (Regional highway)
2	Board Bazar	Major Centre	Planned	Board Bazar Bus Stop	Gacha Union (GCC)	GMA	1	<ul style="list-style-type: none"> • Existing urban agglomeration • Very large population base (of the former Gacha Union; larger than former Gazipur Pouroshava in 2011) • Excessively rapid growth rate (of the Union, 2001-2011) • Industrial agglomeration (mainly RMG along the road corridor) • Large employment base • Dense & varied commercial activity • Proposed BRT/Metro access • Road access by Dhk-Mymensingh National highway
3	Vogra Bypass Chourasta	Major Centre	Planned	Vogra Chourasta Bus Stop	Basan Union (GCC)	GMA	1	<ul style="list-style-type: none"> • Large population base (of the former Basan Union) • Very rapid growth rate (of the Union, 2001-2011) • Industrial agglomeration • Employment base • Varied commercial activity • Critical transport node (Dhk-Mymensingh & Dhk Bypass intersection) • Proposed BRT/Metro access • Road access by Dhk-Mymensingh National highway

SI No.	Name of Centre	Hierarchy Type	Nature	Central Point	Admin. Unit	Proposed Zone in Structure Plan	Walking Catchment (km)	Character/features for Selection
C. Eastern Region								
1	Purbachal	Regional Centre	Planned	Purbachal BRT Stop	Daudpur, Nagari & Rupganj Union (Partial)	OUA	2	<ul style="list-style-type: none"> • Main urban centre for the Eastern Region (Proposed) • Very large planned urban settlement • Core CBD type commercial area • Full range of proposed services including administration, research & institutions, health, education & recreation • Mass transit connectivity (proposed BRT) • Road access through 300 ft Purbachal road
2	Kaliganj	Major Centre	Planned	Kaliganj Bus Station	Kaliganj Pouroshava	GMA	1	<ul style="list-style-type: none"> • Urban centre for the North-western part • Old urban agglomeration • Existing urban administrative unit (Pouroshava) • Existing rail station (Arikhola) • Road access by Tongi-Ghorashal regional highway
3	Gausia	Major Centre	Planned	Golakandail Bus Stop	Golakandail Union	GMA	1	<ul style="list-style-type: none"> • Existing trading centre • Rapidly growing population (of the Union; 3 times the rate of the region) • Large scale commercial activities • Wholesale and business hub for the surrounding centres • Critical transport junction (3 major national & regional highways) • Road access by Dhaka-Sylhet highway and Dhaka bypass

SI No.	Name of Centre	Hierarchy Type	Nature	Central Point	Admin. Unit	Proposed Zone in Structure Plan	Walking Catchment (km)	Character/features for Selection
4	Murapara	Major Centre	Potential	Mongolkhali Bus Stop	Murapara Union	GMA	1	<ul style="list-style-type: none"> • Existing urban settlement • Commercial activities • Industrial units • Basic services • Road access by Bhulta regional highway • River way (Shitalakhya) access (Murapara ferry ghat) • Proposed extension road (Madani ave. to Murapara)
5	Tarabo	Specialized Centre	Established	Bishwa Road Bus Stop	Tarabo pouroshava	OUA	2	<ul style="list-style-type: none"> • Current urban centre serving the sub-region • Considerable population base & high growth rate • Existing admin. Unit (Tarabo Pouroshava HQs) • Core commercial & other mixed activities • Industrial cluster • Employment base • Wide range of services • Proposed BRT/Metro access • Road access by Dhaka-Sylhet highway & Demra regional highway
D. Southern Region								
1	Narayanganj	Regional Centre	Established	Narayanganj Rail station	Narayanganj CC	OUA	2	<ul style="list-style-type: none"> • Largest urban agglomeration in the Southern region • Very old & established city • Renewed administrative significance through formation of new City Corporation HQs • Regional business hub • Traditionally developed industrial centre • Large employment base • Full range of services • Proposed MRT access

SI No.	Name of Centre	Hierarchy Type	Nature	Central Point	Admin. Unit	Proposed Zone in Structure Plan	Walking Catchment (km)	Character/features for Selection
2	Chittagong Road	Major Centre	Planned	Dhk-Ctg Highway-Adamjee Rd. intersection	Narayanganj CC	OUA	1	<ul style="list-style-type: none"> • Large urban agglomeration • High growth (part of former Siddhirganj Pouroshava, now NCC) • Designated urban territory (within NCC) • Existing retail & business centre • Employment base • Wide range of services • Critical transport node(intersection of N'ganj-Demra & Dhk-Ctg highway) • Road access by N'ganj-Demra & Dhk-Ctg highway
3	Pagla	Major Centre	Planned	Pagla Station Rail	Kutubpur Union	GMA	1	<ul style="list-style-type: none"> • Large population size (of the Kutubpur Union) • High growth rate (of the Kutubpur Union) • Existing industrial & business centre • Employment base • Wide range of services • Rail access (Pagla rail station) • Road access by old Dhk-N'ganj highway
4	Fatulla	Major Centre	Planned	Fatulla Station Rail	Fatulla Union	GMA	1.5	<ul style="list-style-type: none"> • Old urban agglomeration • Large population size & high density (of the Union) • High growth rate (of the Union) • Existing industrial & business centre • Employment base • Wide range of services • Rail access (Fatulla rail station) • Road access by old Dhk-N'ganj highway
5	Kadam Rasul	Major Centre	Potential	Madanpur-Pouroshava rd. intersection	Narayanganj CC	GMA, Agri.	1	<ul style="list-style-type: none"> • Main urban settlement of the Bandar upazila • Formerly separate Pouroshava • Potential of growth in the eastern side of Shitalakhya • High potential for accessibility (proposed Shitalakhya 3rd bridge)
6	Signboard	Major Centre	Potential	Dhk-Ctg Highway-N'ganj Link Rd. intersection	Narayanganj CC	GMA	1	<ul style="list-style-type: none"> • Major intersection • High growth potential regarding easy accessibility • Future Metro coverage proposal

SI No.	Name of Centre	Hierarchy Type	Nature	Central Point	Admin. Unit	Proposed Zone in Structure Plan	Walking Catchment (km)	Character/features for Selection
F. Western Region								
1	Savar	Regional Centre	Established	Savar Bazar Bus Stop	Savar (Pouroshava)	OUA	2	<ul style="list-style-type: none"> • Main urban centre for the Western region • Admin. HQs (Savar Pouroshava) • Strong employment base (incl. industry) • Very high growth rate • Full range of general services • Proposed BRT access • Road access by Dhk-Aricha highway
2	Aminbazar	Major Centre	Planned	Aminbazar Bus Stop	Tetuljhara Union	GMA	1	<ul style="list-style-type: none"> • Existing urban agglomeration • Growth potential • Core commercial activity • Wide range of services • Proposed BRT access • Road access by Dhk-Aricha highway
3	Hemayetpur	Major Centre	Planned	Hemayetpur Bus Stop	Tetuljhara Union	GMA	1	<ul style="list-style-type: none"> • Existing urban agglomeration • Main centre serving the area between Savar & Keraniganj • Dense & varied commercial activity • Wide range of services • Proposed BRT access • Road access by Dhk-Aricha highway
4	Ashulia	Major Centre	Planned	Ashulia Bazar Bus Stop	Ashulia Union	GMA, Conserv.	1.5	<ul style="list-style-type: none"> • Existing agglomeration • Excessively rapid growth (of the Union) • Dense & varied commercial activity • Key intersection • Wide range of services • Road access by Dhk-Ashulia highway & Birulia-Akran rd.
5	Jirabo	Major Centre	Planned	Jirabo Bus Stop	Yearpur Union	GMA	1.5	<ul style="list-style-type: none"> • Existing agglomeration • Excessively rapid growth (of the Union) • Dense & varied commercial activity • Key intersection • Wide range of services • Road access by Dhk-Ashulia highway & Birulia-Akran rd.

SI No.	Name of Centre	Hierarchy Type	Nature	Central Point	Admin. Unit	Proposed Zone in Structure Plan	Walking Catchment (km)	Character/features for Selection
6	Baipail	Specialized Centre	Established	Baipail Bus Stop	Dhamsona Union	GMA	2	<ul style="list-style-type: none"> • Large population size (of the Union; greater than Savar Pouroshava in 2011) • Excessively rapid growth (of the Union) • Industrial cluster incl. EPZ • Large employment base • Varied commercial activity • Major intersection in the North-west • Proposed Metro access • Road access by Dhk-Ashulia highway & Nabinagar-Chandra rd.

Notes:

OUA= Outer Urban Area

GMA= Growth Management Area

Agri.= Agricultural Area

Conserv.= Conservation Area

Annex-4.1: Infrastructure Suitability of Dhaka Metropolitan Region

An ecological and economical optimal as well as a climate change resilient urban development plan takes the spatial variations of sub ground conditions into account. Geological sub ground investigations provide spatial knowledge about the distribution of earth's sub-surface materials, their age and extent, physical properties, depositional environment and general geotechnical characteristics. Spatial information on the geological setting determines the initial physical and engineering properties of the building ground.

Planning of urban development activities need to consider the suitability of land for various types of infrastructure and open areas based upon the soil conditions. The latter are important for a proper foundation design. Sustainable and safe infrastructure on weak soil will need a very strong and therefore expensive foundation.

The first Infrastructure Suitability Map of the Greater Dhaka City (see **Map-4.1.1** in **Aneex-4.1**) is a re-classification of the Geomorphology in the area of RAJUK area supported by the following criteria:

- 1) Geo-engineering properties of the geomorphic unit based on SPT-testing and geotechnical laboratory investigations comprising standard engineering geological sample analyses (e.g., grain size analysis, evaluation of Atterberg limits, Consolidation test, Unconfined Compressive Strength test);
- 2) Sediments overlying the Madhupur Clay, as the Madhupur Clay is an over-consolidated soil which can be suitable as a foundation layer for light infrastructure;
- 3) Sediment thickness above DupiTila Formation, as from the geo-engineering point of view the DupiTila Formation is the hard sandy ground representing the foundation layer to place the piles on;
- 4) Flood Hazard (Elevation).

Using the described criteria, the area is divided into five suitability classes:

Very Good: Generally suitable for highly sensible infrastructure (e.g., hospitals, energy, and education) and residential settlement.

Good: Largely suitable for general infrastructure and residential settlement (based on detailed site investigations).

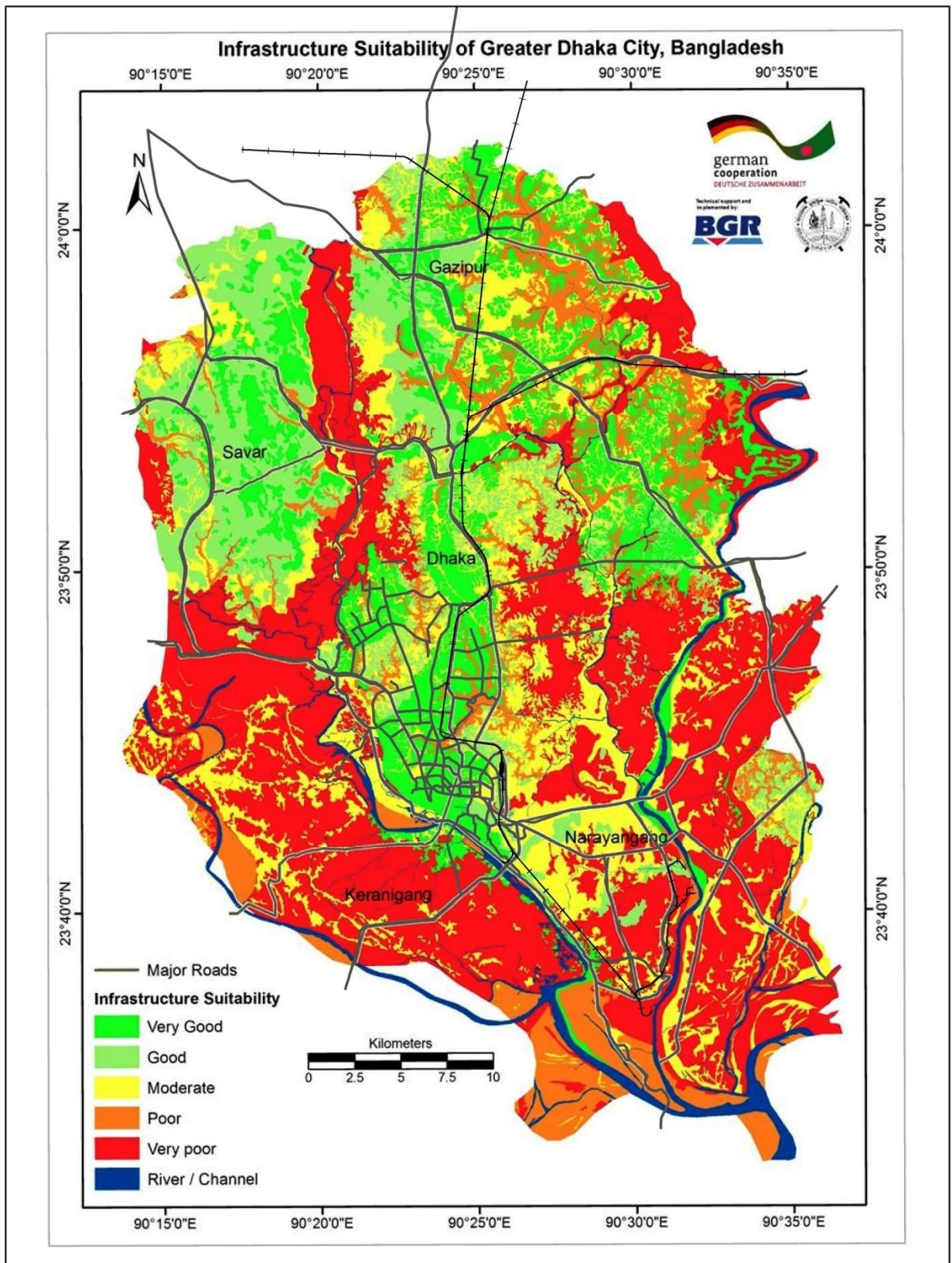
Moderate: Only partly suitable for infrastructure (detailed site investigations mandatory).

Poor: Not suitable for general infrastructure, partly suitable for residential settlement based on detailed site investigations. Technical improvement of building ground necessary.

Very Poor: Not suitable for any settlement (flooding areas), good for open space and recharge area.

The following **Table-4.1.1** in **Annex-4.1** gives an overview of the different infrastructure suitability classes in Greater Dhaka City. The areas with an infrastructure suitability of "Very Good", "Good" and "Moderate" should be considered for larger infrastructures, never neglecting proper on-site investigations. The areas classified as "Poor" and "Very Poor" should not be considered for any large infrastructures. Also minor infrastructures need a very detailed on-site sub-surfaces geotechnical investigation for secure foundation design due to the low bearing capacity and the high hazard potential. Land use should be restricted to parks, open spaces, recreation areas, flood flow zone and lakes.

The Madhupur Terraces area in Greater Dhaka City is in general very good to good building ground. Most parts of Narayanganj City are situated on the high floodplain which has moderate infrastructure suitability. Keraniganj on the other hand is located on low floodplain which has very poor infrastructure suitability.



Map-4.1.1: Infrastructure Suitability of Greater Dhaka Region (Source: GSB)

Table-4.1.1: Overview of Infrastructure Suitability Classes

	Infrastructure Suitability	Sediments overlying the Madhupur Clay	Sediment thickness above DupiTila Formation [m]	Average Elevation msl	SPT N30 down to 20m	Plasticity	Infrastructure foundation suitability	Suggested land use suitability
	Very Good	Madhupur Clay is exposed.	7 - 11	11 - 16	11 - 29	Stronger Plasticity	4 - 6 story light infrastructure is suitable with a foundation depth of up to 3 m. Large and tall infrastructure requires pile foundation placed on DupiTila Sandstone.	Commercial area, Residential area, Industrial zone
		2-3 m thick, compacted sediments.						
	Good	Highly dissected Madhupur Clay is exposed.	8 - 12	11 - 15	11 - 27	Stronger Plasticity	4 - 6 story light infrastructure is suitable in Madhupur Clay. General foundation depth is within 4 m, at places higher. Large and tall infrastructure requires pile foundation placed on DupiTila Sandstone.	Commercial area, Residential area, Industrial zone
	Moderate	Moderate thickness (± 2 m) of soft sediments	10 - 15	7 - 11	7 - 25	Weaker Plasticity	4 - 6 story light infrastructure requires on-site subsoil investigation and proper foundation design. Deep pile foundation is needed for large and tall infrastructure.	Industrial zone, Residential area, Commercial area, Agricultural zone, Park and Recreation
	Poor	5 - 7 m of loose and soft silty clay and clayey silt with few layers of organic clay; at places Madhupur Clay is missing.	12 - 20	6 - 7	7 - 25	Weaker Plasticity	Detail subsoil investigation and proper foundation design is required for all types of infrastructure, due to low bearing capacity with hazard potential.	Agricultural zone, Flood flow zone, Wetland, Rural settlement, Park and Recreation
	Very Poor	Mainly silty clay, with alternate layers of organic clay and peat. Thickness is more than 10 m. In low floodplain areas less organic layers can be expected.	20 - >50	5 - 7	5 - 22	Weaker Plasticity	Detailed subsoil investigation for deep pile foundation is essential, due to very low bearing capacity and high hazard potential. Shallow foundation is not preferred.	Agricultural zone, Flood flow zone, Wetland, Rural settlement, Park and Recreation

*Required to raise ground surface above the 100 years (± 7.5 m AMSL) event flood level.

ANNEX-6.1: COST OF PROPOSED TRANSPORT INFRASTRUCTURE

The proposed future infrastructure projects cost (tentative) for next twenty years is about US \$38 billion which is shown in Table below.

Table-1: Tentative Infrastructure Cost

Proposed Infrastructure	Unit (Length / No.)	Tentative Cost (in Million US\$) ¹	Construction Phase
Ring Roads	256 Km	2,000	Phase I
Primary Roads	550 Km	900	Phase II
Secondary Roads	202 Km	2,500	All Phase (Incremental)
Elevated Expressway (3 no.)	60 Km	4,000	Phase III
MRT	5 nos.	15,000	All Phase (Incremental)
BRT	3 nos.	1,500	All Phase (Incremental)
Bus Network ²		700	Phase I - II
Circular waterway - Phase II	40 km	100	Phase I - II
Commuter Railway Expansion	70 Km	2,100	Phase I - II
Bus Terminal (XXX units)	3 nos.	300	All Phase (Incremental)
Truck Terminal (XXX units)	3 nos.	150	All Phase (Incremental)
Inland Container Depot (Railway)	1 no.	500	Phase II
New Airport	1 no.	8,000	Phase IV
Multimodal Terminal	5 nos.	100	All Phase (Incremental)
Multistoried Parking	10 nos.	100	All Phase (Incremental)
TOTAL		37,950	

Note: ¹ - At current price. Actual cost will be estimated after feasibility/detail study of each infrastructure

² - Refer to the report of "Dhaka Bus Network and Regulatory Reform Implementation Study and Design Work" for cost estimation

It would be difficult for the government to finance all the infrastructure development over next twenty years as such involvement of private sectors should be encouraged very strongly. An integrated phase wise development program should be prepared and participation of development partners and private sector should be pursued.

ANNEX-6.2: Incremental Road Network Development

Phase-I: 2016-2021

- **Purbachal Road** will provide regional east-west connectivity from Kuril and airport area to Purbachal new town, Bhulta and Narsingdi area thus providing new link to Dhaka-Sylhet highway and Dhaka-Chittagong highway.
- Extension of **Madani Avenue** will provide new east-west connectivity from Gulshan to newly developing Eastern fringe area and will continue to link with Dhaka-Sylhet highway at Bhulta in future.
- **Moghbazar-Mouchak Flyover** will improve smooth movement of motorized traffic over railway crossings in that area.
- **Jatrabari Road** will be widened to eight lanes upto Kanchpur Bridge to accommodate the busiest corridor of Dhaka-Chittagong highway.
- The **new additional four-lane Kanchpur and Meghna Bridge** will increase highway capacity three times of Dhaka-Chittagong highway between Jatrabari and Daudkandi.
- The **Third Shitalakhya Bridge** will provide new connectivity between Munshiganj, Narayanganj and Chittagong region.
- **Bus Rapid Transit** (BRT Line 3 additional) project will be introduced from Gazipur to Airport and will become the first mass transit system of the country.
- **Mass Rapid Transit** (MRT Line 6) project will be introduced from Uttara and Mirpur to Motijheel and will also be the first rail-based mass rapid transit system of the country.
- The **Wholesale Market at Kawran Bazar** will be shifted to **Mohakhali** and **three new wholesale markets under construction at Mirpur (Gabtali), Jatrabari and Lalbag.**
- **Dhaka Elevated Expressway** (PPP) will provide grade-separated access within Dhaka city for motorized traffic from Jatrabari to Airport.
- **Dhaka Bypass** (PPP) will be widened to four lane under PPP and provide access-controlled travel from Madanpur to Gazipur.
- **Joydebpur to Elenga Highway** will be widened to four lanes to provide better access from Dhaka and Gazipur to Northwest part of the country.
- Development of Western Bypass from Mawa Road to Dhaka Bypass (part of proposed Middle Ring Road);
- Development of Eastern Bypass
- Construction of Road from Tongi to Signboard;
- Construction of Road from Sonargaon to Mohakhali along Rail line;
- Construction of Inner Ring Road

Phase-II: 2021-2026

- Construction of 2nd Part of Middle Ring Road from Ashulia to Dhaka Bypass near Nawjor of Gazipur;

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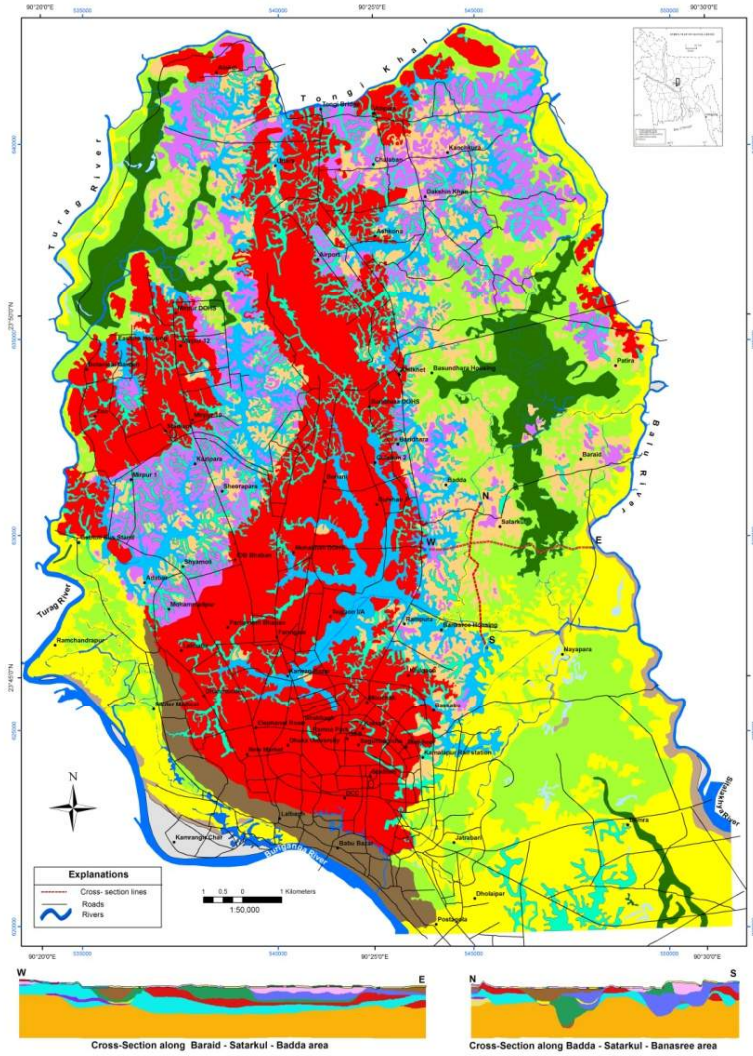
Phase-III: 2026 to beyond

- Construction of Outer Ring Road

ANNEX-6.3: MASS TRANSIT PROPOSALS FOR RAJUK AREA

SL.NO	Type	ID	Description	Phase
1	BRT	BRT-1	Nabinagar-Gabtohi-Azimpur-Gulistan-Demra-Tarabo	Phase-I/II
2	BRT	BRT-2	Baipayl-Ashulia-Abdullahpur	Phase-II
3	BRT	BRT-3	Gazipur-Airport-Jhilmeel RA	Phase-I
4	MRT	MRT-1	Purbachal-Kuril-Khilgaon-Kamlapur-Narayanganj	Phase-II/III
5	MRT	MRT-2	Eastern Bypass (Narayanganj-Eastern Fringe-Gazipur)	Phase-II
6	MRT	MRT-3	Rampura-Bhulta	Phase-II
7	MRT	MRT-4	Extension of MRT-6 (Uttara 3rd Phase to Gazipur)	Phase-I
8	MRT	MRT-5	Gabtohi-Mirpur (via Mirpur-10-Mirpur 14)-Banani	Phase-I/II
9	MRT	MRT-6	Uttara 3rd Phase-Mirpur-Motijheel C/A	Phase-I

Engineering Geological Map of Dhaka City, Bangladesh (Central Part of Greater Dhaka City)



Description of the Map Units and Generalized Cross-Sections

High floodplain deposits
This unit is generally flat situated above annual flood level (> 4.0m AMSL). The top layers are mainly alternating silt clay and clayey silt with occasional thin sand layer. Light gray to light brown brown in colour. Worm burrows, root tubes and vegetal matter are also common. The percentage of sand, silt and clay ranges between 7-10, 70-76 and 15-20 respectively. It is naturally medium compacted and low-plastic with moderate PGA (Peak Ground Acceleration) potential. Moderately good for light civil infrastructures with proper foundation, but needs detailed geotechnical investigation of the site.

Low floodplain deposits
This unit is extended flat, annually flooded poorly drained land. It consists of alternating silt, clay, fine sand, peaty clay and occasionally layers of peat. Alternating layers of blackish-gray organic clay and blackish-brown silt clay are generally present in down slope areas near marshy land. Thickness of peat layers ranges from a few to 30 centimeters. Occasional thick layers of light gray to yellowish-brown silt clay with mottling and ferruginous concretions are present in greater depth. Partially decomposed roots and worm burrows are common at the upper part. This unit is generally loose and soft with high PGA potential. Vulnerable building ground with high hazard potential. Civil infrastructures needs very deep foundation based on detailed geotechnical investigation.

Marsh silty and peaty clay
This unit is the deepest part of the area situated between 1.3-2.2 meters AMSL. Most of the area remains under water except during the winter season. The deposit consists mainly of gray to light-gray organic clay, dark gray peaty clay and dark-brown peat. At places, the organic clay and peat are intercalated by sandy silt. Vertically oriented and feathered nodules logs are present at places. Sporadic patches of reddish to yellowish-brown silt clay with orange-red mottling are present. The sediments are highly plastic and sticky with high moisture content. It behaves like liquid and collapses with slight load. This unit is highly susceptible to liquefaction with very high PGA potential. Very bad foundation condition and building ground for civil infrastructures with very high natural hazard potential.

Abandoned channel deposits
This unit consists mainly of silt, clay and clayey silt, dark gray to brownish gray in colour with occasional yellowish brown mottling. Organic clay and peat layers, lenses of partly decomposed peat shells and very fine sand inter-bedded with clay are also common at places. The sub-surface layers are very soft. Very bad foundation condition for civil infrastructures with very high PGA and very high flood and other natural hazard potential.

Old natural levee deposits
Natural levees formed by the channels mainly of Buriganga River depositing dominantly of fine to coarse grained gravel to brownish gray sand and clayey silt on top of Madhupur Clay terrace. This unit is moderately compacted and low plastic. This unit has higher elevation than its surroundings. Good for civil infrastructures with low PGA (Peak Ground Acceleration) but needs proper geotechnical site investigation.

Younger natural levee deposits
Natural levees are formed by the active more channels consists dominantly of alternating layers of gray coloured fine sand and clayey silt of various thickness, deposited over the flood plain sediments. Generally it is low plastic and loose to moderately compacted with moderate PGA potential. This unit has higher elevation than its surroundings. It is moderately good for civil infrastructures with proper foundation based on sub-surface geotechnical investigation.

Point bar deposits
This deposits consist mainly of loose and fresh medium to fine grained gray coloured sand and silt. Few thin laminations of silty clay are common at various depth. The general elevation of this unit is lower than the surroundings. The loose sub-surface layers with high to moderate PGA and other natural hazard potential are not good for civil infrastructures with normal foundation.

Broad valley deposits
The sediment consists mainly of light gray to dark gray sticky clayey silt. Thin layers of yellowish gray to yellowish-brown clayey silt washed out from Madhupur Clay units and blackish-gray organic clay are present at various depths. Thin layers of gray loose fine sand are also common. The sediments are plastic and medium compacted. Generally it overlies the eroded Madhupur Clay surface with variable thickness. This unit has highly variable sub-surface strata as well as high to moderate PGA potential and hazard susceptibility. The deep foundation of the civil infrastructures must be placed on stable layers based on detailed geotechnical investigation.

Narrow valley deposits
The sediments are mainly consists of light gray to dark gray sticky clayey silt. It deposits mainly in the eroded gullies nearby narrow valleys formed by several dendritic drainage channels of Madhupur Clay terrace. Few thin layers of yellowish-brown, fine sand and blackish-gray organic clay are also common. Generally the sediments are low plastic and medium compacted which are deposited on top of eroded Madhupur Clay surface. The PGA potential is high to moderate and other natural hazard potential is low. The foundation of the civil infrastructures must be designed based on detailed geotechnical investigation as the sub-surface strata is highly variable.

Madhupur Clay (Upper terrace)
This is the highest elevated, flattened and low dissected part of Madhupur Clay terrace. This unit is characterized by over consolidated, brick red to reddish brown highly oxidized clayey silt with orange and metallic scales to brown ferruginous nodules. Little amount of medium to fine grained sand with mica are also present. Secondary light brown gray plastic silty clay is deposited along fractures and animal burrows. Accumulated iron oxides formed the nodules having a nucleus. The reddish of colour, increase with depth. The clay is mainly kaolinitic and like. The sediments are highly compacted, plastic and sticky. It is resistant to erosion with low infiltration potential and very hard when dry. This top layer is mainly weathered medium peat altered during Pleistocene period which is underlain by compacted yellowish brown sandy silt with occasional discontinuous layers of cohesive sand and clayey silt. All places, this unit underlain fine sandy silt layer are not present. All of these layers are underlain by the over consolidated yellowish brown medium to coarse grained sand of Dupi Tila Formation of the Pleistocene age, which is the best alternative layer in the city. It is recommended that the foundation of all heavy and high-rise civil infrastructures preferably placed on this layer. Madhupur Clay unit is also a very good foundation layer for moderately high civil infrastructures with low PGA, but require deep foundation for high structures based on detailed sub-surface geotechnical investigation.

Madhupur Clay (Middle terrace)
This unit is the rugged, highly dissected and eroded part of Madhupur Clay terrace, which has lower elevation than the upper terrace. The litho-characteristic of this unit is almost same as Madhupur Clay (upper terrace) but the colour varies from yellowish-brown to reddish brown. The reddish of colour increases with depth but it is lighter than the upper terrace. It is equally resistant to erosion with low infiltration potential and is very hard when dry. This unit is the typical weathering zone of fluctuating water table. In this unit the residual part is underlain by fine sandy silt layer with few exceptions and followed by the Dupi Tila Formation. The PGA and other natural hazard potentials are also low but the flood hazard is relatively higher than the upper terrace due to lower elevation. Good building ground but require careful foundation design based on detailed sub-surface geotechnical investigation.

Madhupur Clay (Low terrace)
This unit is the flattened and highly eroded part of Madhupur Clay terrace which is situated almost at floodplain level mainly along the extreme edges, also present as individual knobs in the floodplains. The lithological characteristics of this unit is almost same as Madhupur Clay (middle terrace) but the colour varies from yellowish-gray to yellowish-brown. Increase of reddish of colour with depth is not prominent. It is equally resistant to erosion with low infiltration potential and is very hard when dry. In this unit the residual part is underlain by fine sandy silt layer with few exceptions and followed by the Dupi Tila Formation. This PGA and other natural hazard potentials are also low but the flood hazard is high as of floodplains. Moderately good building ground but require careful foundation design based on detailed engineering geological and geotechnical investigation.

Geological Formation	Model Litho Unit	N-value Range, SPT	Thickness (m)	Geological Unit	Generalized Cross-Section	Depth of foundation required for (in meters)	Remarks	
Holocene (Recent) As Thickness: all m	Artificial Fill	1-4	2-6	High floodplain deposits		8-12 12-15	Very bad BG** High HPM**	
	Organic silt	1-3	1-6	Low floodplain deposits		14-16 15-20	Unsuitable very bad BG** High HPM**	
	Silty Clay	3-8	6-8	Marsh silty and peaty clay		20-28 25-40	Very bad BG** High HPM**	
	Clayey silt	6-12	2-6	Abandoned channel deposits		20-28 22-40	Very bad BG** High HPM**	
	Cohesive Sand	6-12	2-4	Old natural levee deposits		4-10 10-14	Good BG**	
	Clean Sand	8-16	1-8	Younger natural levee deposits		7-11 12-18	Moderate BG**	
Madhupur Clay (Pleistocene) As Thickness: all m	Artificial fill	6-20	4-11	Broad valley deposits		10-12 12-20	Bad BG** High HPM**	
	Very heavy silt	7-15	3-6	Narrow valley deposits		10-12 12-15	Bad BG** High HPM**	
	Medium silt	8-15	1-3	Madhupur Clay (Upper terrace)		3-6	8-11	Good BG**
Dupi Tila Formation (Plio-Pleistocene)	Very heavy silt	15-30	3-5	Madhupur Clay (Middle terrace)		4-8	10-13	Good BG**
	Clean Sand	15-30	3-5	Madhupur Clay (Lower terrace)		8-11	10-18	Good/Moderate BG** Low HPM**
Dupi Tila Formation (Plio-Pleistocene)	Sand	>30	>400	Highest depth to Dupi Tila from surface >52m	Escalator BG**	Note: * Above 100 yrs flood level (± 0.5 m) AMSL ** BG = Building Ground *** HPM = Hazard Potential		

Government of the People's Republic of Bangladesh
Ministry of Power, Energy and Mineral Resources
Energy and Mineral Resources Division
Geological Survey of Bangladesh

October, 2011

**Engineering Geological Map of Dhaka City, Bangladesh
(Central Part of Greater Dhaka City)**
Scale: 1:50,000

**Branch of Urban and Engineering Geology
Dhaka, Bangladesh**

Location on Topographic Sheet

Projection Information:
WGS 1984 UTM Zone 46N
Projection: Transverse Mercator
False Easting: 500000.000000
False Northing: 0.000000
Central Meridian: 90°
Scale Factor: 0.999600
Latitude of Origin: 0°
Linear Unit: Meter

3-Dimensional Geological Model of Gulshan & Kakrail Area

3-Dimensional Geological Model of Badda-Satarkul-Baraid Area

Data Sources:
Aerial Photographs (1952-55), 1:40,000; Satellite Images (Landsat, SPOT), Survey of Bangladesh Topographic Sheet, 1:50,000 (1972 and 1979), Atlas of Urban Geology, Vol. 11, UN-ESCAP, 1999
Sub-surface Geotechnical Investigation Borehole Data (814 nos.)

Field Work Period: During 2008 to 2010

Analysis, Interpretation and Cartography:
A. T. M. Asaduzzaman, Mohammad Abdul Aziz Pathway,
Mohammad Akbarul Kamal, Nurun Nafar Faruq, Sultana Nasrin Nury,
Sarwat Jabben Md. Nuruzzaman Sabuj (of GSB) and
Rolf R. Ludwig, M. Toczycki (of BGR, Germany)

Warning:
This general Engineering Geological Map serves as a base for urban planning. Object planning and construction work needs further details for specific type. This map is not the replacement of detailed sub-surface geotechnical study for any civil infrastructure foundation design and development.

Issued by the Director General, Geological Survey of Bangladesh
153 Pioneer Road, Segunbagicha, Dhaka-1000, Bangladesh
Phone: +880-2-932114, +880-2-931005, Fax: +880-2-933019, +880-2-931065,
E-mail: geotagsurvey@do.gov.bd, asagbt@yahoo.com, Web site: www.gov.bd

ANNEX –12.1: GENERAL URBAN DESIGN GUIDELINES

a. Architecture

- Relate architecture to Dhaka's unique climate and geomorphology.
- Encourage designs that are sensitive to the scale, form, rhythm, proportions, and materials in proximity to commercial areas and residential neighborhoods that have a well-established, distinctive character.
- Provide architectural features that establish and define a building's appeal and enhance the neighborhood character.
- Locate buildings on the site so that they reinforce street frontages.
- Design walls and fences to add visual interest to the streetscape and enhance the pedestrian experience.
- Provide convenient, safe, well-marked, and attractive pedestrian connections from the public street to building entrances.

a. Historic Character

- Respect the context of historic buildings, landmarks, and areas that give a community a sense of place or history.
- Create conservation plans for new development, so that city's historic character is complemented within the conservation areas where appropriate.

b. Transit Integration

- Incorporate existing and proposed transit stops or stations into project design.
- Provide attractively designed transit stops and stations that are adjacent to active uses, recognizable by the public, and reflect desired neighborhood character.
- Design safe, attractive, accessible, lighted, and convenient pedestrian connections from transit stops and stations to building entrances and street network
- Provide generous rights-of-way for transit, transit stops or stations.
- Locate buildings along transit corridors to allow convenient and direct access to transit stops/stations.

c. Streets

- Design streets to improve walkability, bicycling, and transit integration; to strengthen connectivity; and to enhance community identity.
- Enhance community gateways to demonstrate neighborhood pride and delineate boundaries.
- Clarify neighborhood roadway intersections through the use of special paving and landscape.
- Discourage use of walls, gates and other barriers that separate residential neighborhoods from the surrounding community and commercial areas.
- Preserve and enhance existing main streets. Extend existing street grid patterns into development within existing fine-grained neighborhoods.
- Provide pedestrian shortcuts through the developments to connect destinations where the existing street system has long blocks or circuitous street patterns.
- Use pedestrian amenities, such as curb extensions and textured paving, to delineate key pedestrian crossings.
- Lay out streets to take advantage of and maximize vistas into public view sheds.
- Establish build-to lines, or maximum permitted setbacks on designated streets.
- Implement pedestrian facilities and amenities in the public right-of-way including wider

sidewalks, street trees, pedestrian-scaled lighting and signs, landscape, and street furniture.

d. Parking

- Promote the use of pervious surface materials to reduce runoff and infiltrate storm water.
- Avoid large areas of uninterrupted parking especially adjacent to community public view sheds.
- Design clear and attractive pedestrian pathways and signs that link parking and destinations.
- Use trees and other landscape to provide shade, screening, and filtering of storm water runoff in parking lots.
- Share and manage commercial, residential, and public parking facilities where possible to manage parking for greater efficiency.

e. Lighting

- Provide lighting from a variety of sources at appropriate intensities and qualities for safety.
- Provide pedestrian-scaled lighting for pedestrian circulation and visibility. Use vandal-resistant light fixtures that complement the neighborhood and character.

f. Signage

- Design project signage to effectively utilize sign area and complement the character of the structure and setting.
- Include pedestrian-oriented signs to acquaint users to various aspects of a development. Place signs to direct vehicular and pedestrian circulation.
- Post signs to provide directions and rules of conduct where appropriate behavior control is necessary.

g. Utilities

- Convert overhead utility wires and poles, and overhead structures such as those associated with supplying electric, communication, community antenna television, or similar service to underground.
- Minimize the visual and functional impact of utility systems and equipment on streets, sidewalks, and the public realm.
- Traffic operational features such as streetlights, traffic signals, control boxes, street signs and similar facilities should be located and consolidated on poles, to minimize clutter, improve safety, and maximize public pedestrian access, especially at intersections and sidewalk ramps.
- Other street utilities such as storm drains and vaults should be carefully located to afford proper placement of the vertical elements.

h. Natural Features

- Preserve and protect natural landforms and features.
- Establish and implement the Conservation Program to conserve Dhaka's natural environment and create a linked open space system.
- Preserve and enhance remaining naturally occurring features such as wetlands, Khals, Lakes, and natural areas.
- Use open space and landscape to define and link communities.

- Link Districts, public attractions, open space and other destinations together by connecting them with trail systems, bikeways, landscaped boulevards, formalized parks, and/or natural open space, as appropriate.
- Locate small parks, play areas and common facilities, in central accessible locations that can be easily accessed by everyone in the development it serves.

i. Development adjacent to Natural Features and Parks

- Design development adjacent to natural features in a sensitive manner to highlight and complement the natural environment in areas designated for development.
- Utilize variable lot sizes, clustered housing, stepped-back facades, split-level units or other alternatives to slab foundations to minimize the amount of grading.
- Provide increased setbacks from open space areas to ensure the visibility.
- Protect views from public roadways and parklands to natural areas and scenic vistas.
- Preserve views and view corridors along and/or into waterfront areas from the public right-of-way by decreasing the heights of buildings as they approach the waterside, where possible.

j. Residential Design

- Provide a mix of housing types, by pursuing innovative designs to meet the needs of a broad range of households.
- Incorporate a variety of unit types in multifamily Housings.
- Identify sites for revitalization and additional housing opportunities in neighborhoods.

k. Commercial Areas

- Create vibrant, commercial main streets that serve as neighborhood destinations, community resources, and conduits to the regional transit system.
- Arrange neighborhood commercial shopping areas that serve as walkable centers of activity.
- Provide attractive and functional commercial corridors which link communities and provide goods and services.

l. Mixed-Use Areas

- Encourage both vertical (stacked) and horizontal (side-by-side) mixed-use development.
- Encourage placement of active uses, such as retailers, restaurants, cultural facilities and amenities, and other various services, on the ground floor of buildings in areas where the greatest levels of pedestrian activity are sought.
- Encourage the provision public space in the form of plazas, greens, gardens, pocket parks, amphitheaters, community meeting rooms, public facilities and services, and social services in mixed use developments.
- Encourage location of mixed-use projects in transition areas and areas where small-scale commercial uses can fit into a residential neighborhood context and minimize negative impacts on the community.

m. POD (Pedestrian Oriented Design)

- Respect pedestrian-orientation by creating entries directly to the street and active uses at street level.
- Design or redesign buildings to include pedestrian-friendly entrances, outdoor dining areas, plazas, transparent windows, public art, and a variety of other elements to encourage pedestrian activity and interest at the ground floor level.
- Orient buildings in town centers to commercial local streets, or to internal project drives that are designed to function like a public street, in order to create a pedestrian oriented shopping experience, including provision of on-street parking.
- Provide pathways that offer direct connections from the street to building entrances.
- Where feasible, use small buildings in key locations to create a human scale environment in large retail centers. Incorporate separate individual main entrances directly leading to the outside from individual stores.

n. Public Space

- Establish build-to lines to frame and define public space and pedestrian streets.
- Ensure public spaces are easily accessible and open to the public.
- Encourage provision of public space in the earliest possible phase of development, as determined by the public's ability to use and access the space.
- entrances, signs, and street furniture.

o. Landscaping

- Promote landscaping and beautification programmes in residential, commercial and industrial areas.
- Intensify the programmes of roadside and street side planting and landscaping of open spaces and recreational areas.
- Some privately owned open spaces, vacant sites and other undeveloped areas in the city, particularly those which are in public view or which are close to landscaped open space, should be properly landscaped to improve environmental amenity.
- Ensure the provision of proper landscaping of existing private open spaces and other vacant areas.
- Strategies need to be formulated to incorporate the rivers and khals and canals into the environmental amenity of the city through the use of landscaping and other improvement measures.
- Ensure the landscaping of rivers and the rehabilitation of embankments.
- Initiate an appropriate strategy for integrating the major rivers and abandoned canals as an amenity and feature of the city's urban design.

p. Special District Unit Plan Area (Superblocks)

- Coordinate the redesign of roads, sidewalks, and open spaces of adjacent developments.
- Locate new infill buildings in a manner that will promote increased pedestrian activity along streets and in public common areas.
- Implement exterior improvements such as public art, pedestrian-scale windows and

ANNEX-12.1: SAMPLE OF URBAN DESIGN IN RAMNA AREA

1. Introduction

The guidelines outline the expectations with regard to design the district in Ramna area and are intended to assist residents, applicants, decision-makers, and staff in the consistent development review, and consideration of future development proposals. The guidelines are to be applied throughout the district and are intended to respond to the varying conditions and constraints inherent to individual site and contextual settings.

The following set of design guidelines for the district in Ramna area has been prepared to facilitate the enhancement of the physical environment and commercial/business functions. The guidelines focus on both the short-term improvement and long-range redevelopment needs of the district. For the short-term, they provide a framework for quality building and street design, especially sidewalks. Many existing buildings do not currently meet these guidelines nor will they be request to undertaken any improvement as a result of the adoption of these guidelines. However, when property owners apply for funding through the design guidelines for any addition, expansion, or exterior change to their property, these guidelines will be used to review their project.

The guidelines are conceptual and intended as recommendations for improving the quality of the built environment along the district. They are standards only and intended to supplement the Dhaka city's codes and Ordinances regarding development. Landowners, business owners, and developers are encouraged to familiarize themselves with the requirements of the zoning and the building codes when making physical improvements to their property.

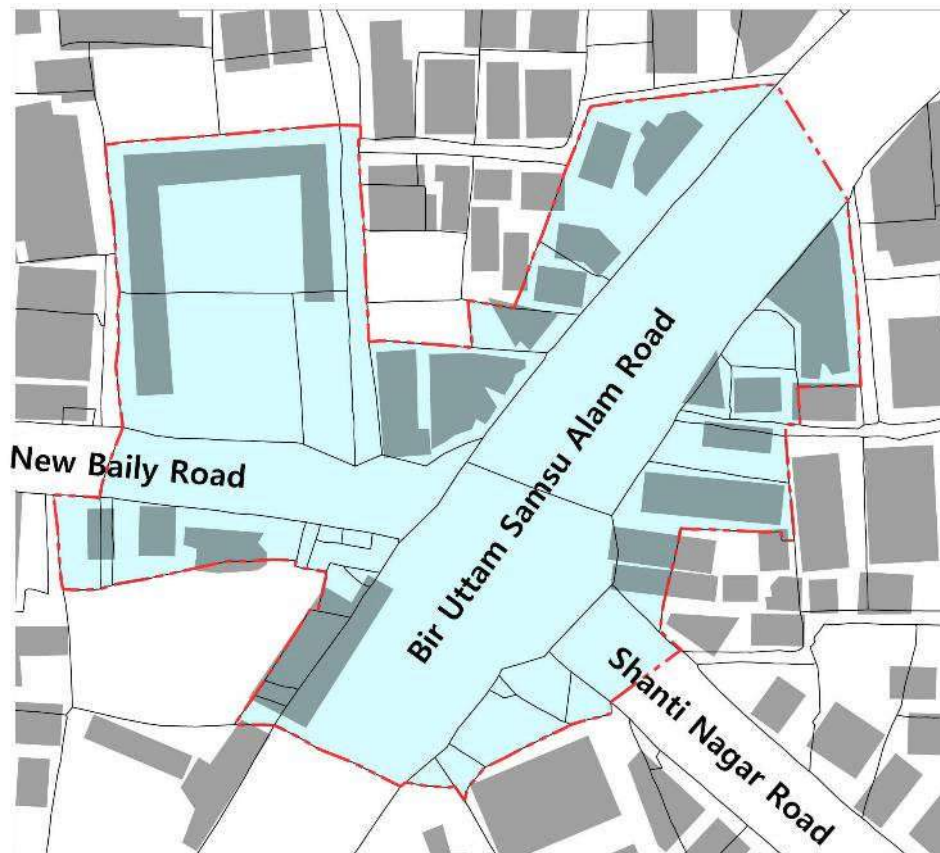


Figure 1. District Boundary map

2. Purpose and Goals

The goal of the sample of design guidelines is to promote quality design throughout the district in Ramna. Achieving this goal will become more challenging as the district is more intensely developed. These guidelines are intended to promote good design that is responsive to its contextual setting.

The purpose of the design guidelines is to:

- a. Assist property owners and developers regarding appropriate site, building, and street design for the district;
- b. Encourage innovation and creativity in the design and use of sites, buildings and signage in the district;
- c. Enhance the visual appeal, and thus the general ambience of the district, making it a more pleasant place for residents and visitors;
- d. Enable an alternate means by which a development can comply with zoning regulations and achieve the goals of those regulations without following a strictly prescribed form.
- e. Strengthen the pedestrian environment.
- f. Provide public spaces that are focal points for enhancing commercial functions.
- g. Provide visual and functional connections between adjacent developments through landscaping, public spaces and pedestrian connections.

These design guidelines are not mandatory requirements; they are voluntary and strongly encouraged.

3. Design Principles

The relationship of buildings to the public and private spaces around them is critical to the overall success of the District. Building placement, massing, and appearance define this relationship. Each building's architectural style and form to provide an environment that encourages pedestrians to linger and experience everything around them. Design elements such as canopies, seating, and the extension of interior uses into the sidewalk area create an active street environment that makes for a great urban place.

And also, the sidewalk guidelines is to enhance the built environment by providing a physical framework that encourages people to walk as part of their everyday routine. Walking is an integral part of every trip, from the parking lot to the grocery store, or to work after parking a bicycle. Dhaka's sidewalks are a part of every trip, big or small, and are essential pieces of infrastructure. Sidewalks must be recognized not as a pedestrian amenity, but as the foundation of Dhaka's urban design improvement.

An equally important goal is to enhance the vitality of streets as public spaces. To encourage sidewalks need to be safe, comfortable, and attractive, with facilities that provide accommodations for people of all ages and abilities. Lively sidewalks become venues for people to participate in face-to-face activities and to support businesses.

4. Buildings

a. Placement

The street is itself as a large outdoor place. The ability to shape this place exists on every street, and its walls are defined by the primary façades of its buildings, which create a street wall. The proximity of the building to the street (placement) and the continuity of buildings placed along the street create the street wall, which is one of the most important components of an urban area.

B-1-1. Making Street Wall

To maintain a consistent street wall, avoid large gaps between buildings, unless the area is used for outdoor amenity space, such as a plaza or forecourt.

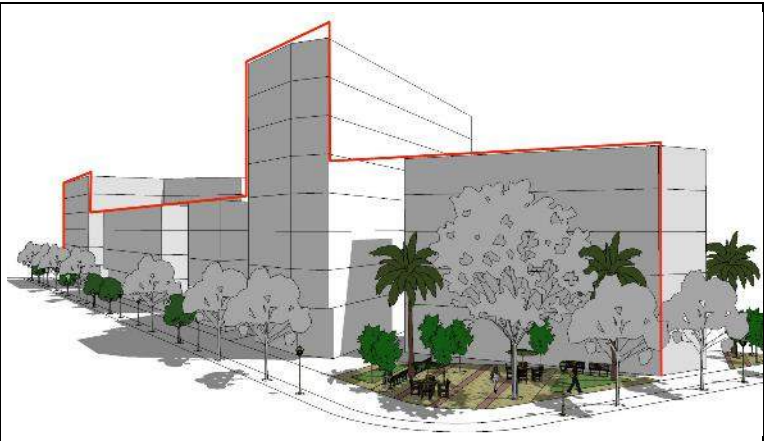


b. Massing

How building mass is distributed on a site usually has the greatest impact on an overall appearance and on the strength of the street wall. Breaking the footprint of a large building into smaller parts and varying a building's height through the creation of smaller structures or façades is a valuable concept when designing large projects that consume half a block or more. Sculpting a building's massing can also help avoid big bulky structures that result in visual monotony rather than visual interest. It is the well-balanced variety of building massing and textures of shadow, light, and material that, in total, add to the richness of the District's built environment.

B-2-1. Various Massing

Break large projects into a series of appropriately scaled buildings so that no building has a width above the 5th Floor that is more than 50m.



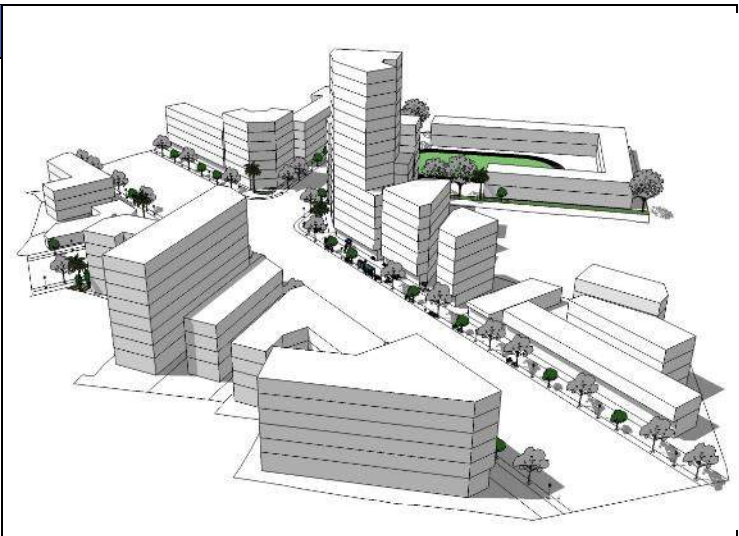
B-2-2. Control the proportion

Buildings and additions should be designed so the mass of the first 3 floors is proportionate to the street. Because the first 3 floors are closest to the street and thus interact most directly with passing pedestrians and vehicles, it is there that the scale and proportion are the most critical.



B-2-3. Making various Skyline

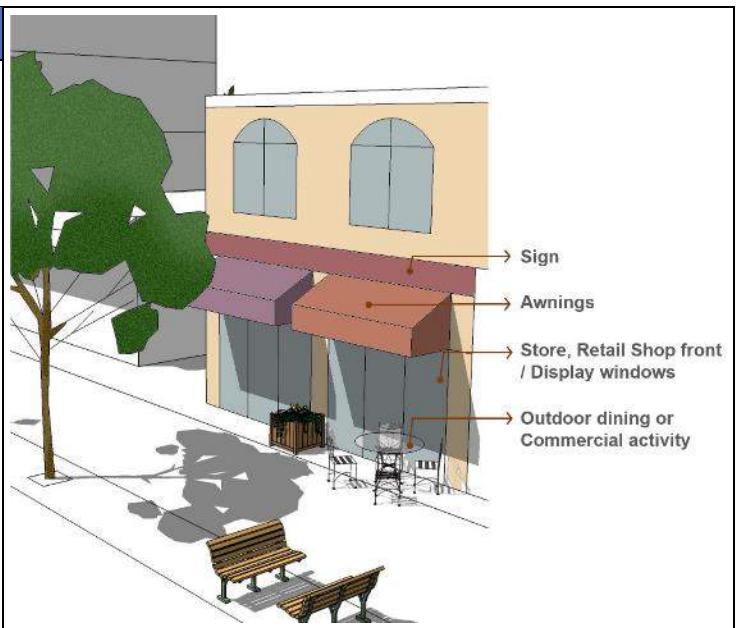
Building towers greatly affect the appearance of the overall skyline. The proportion of height to width is critical to avoid the 'monolithic block' appearance. Reducing the bulk of the top of a tower ("sculpting" the tower) can make it more attractive.



c. Façades

B-3-1. Façadedesign control

Facades of buildings that face the street should incorporate human-scale detailing through the use of reveals, belt courses, cornices, expression of structural or architectural bays, recessed windows or doors, material or material module changes, color and/or texture differences, or strongly expressed mullions.



B-3-2. Continuous façade

All sides of a building should be continuous in design. No side should be unimproved. All architectural details, such as roof lines and parapets, should continue around all sides of a structure.



5. Sidewalks

These guidelines set high standards for accessibility, safety, environmental performance, and aesthetics in sidewalk design. In all cases these guidelines should be viewed as the minimum design criteria for all sidewalk construction and reconstruction in Dhaka. However, it is also recognized that sidewalk construction often occurs in constrained environments where narrow rights-of-way, utilities, steep grades, and historic streets are key factors to consider when designing accessible sidewalks.

Sidewalks also occupy valuable space that can be used to support healthy trees and manage storm water.

- Accessible to all

Sidewalks must be safe and accessible for all users, regardless of physical abilities or age. They should be welcoming to people in wheelchairs, those pushing strollers, and those with carts or suitcases. Sidewalks should have continuous and unobstructed pathways and sight lines.

- All Weather Access / Storm-water Management

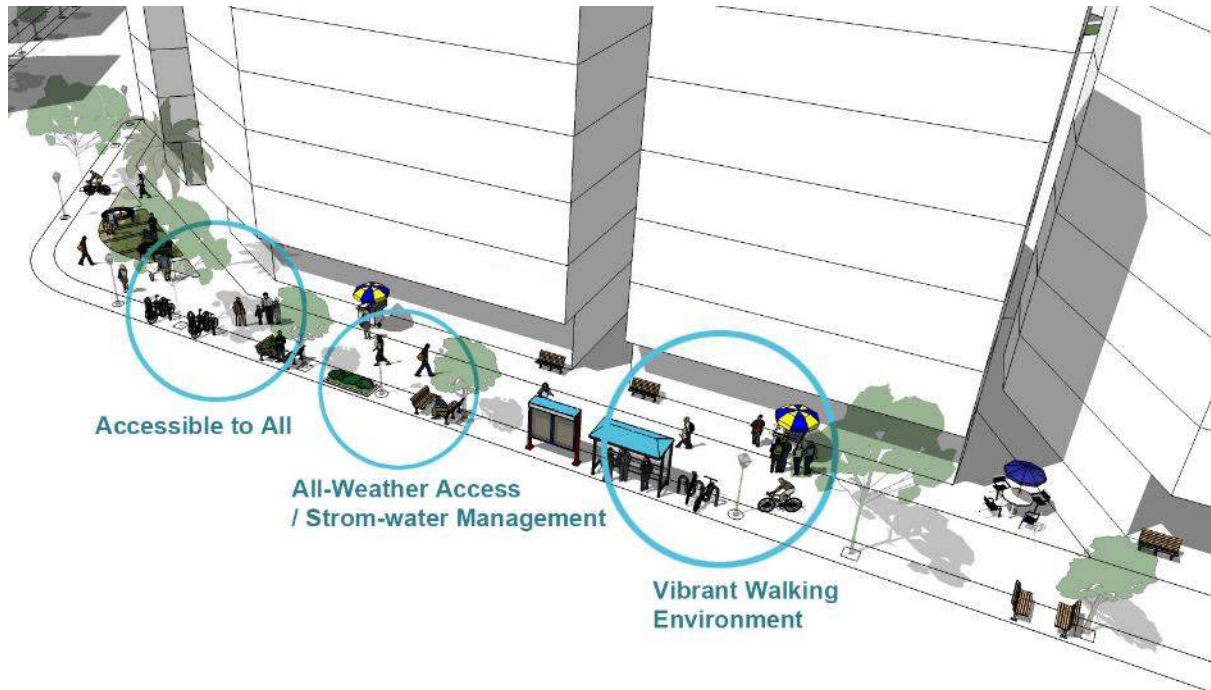
Sidewalks should be designed to eliminate storm-water "ponding," especially at transitions and ramps. Shade trees should be provided for comfort during warmer months, and bus shelters for inclement weather. And also, sidewalks should be designed to divert storm-water to soil rather than to pipes wherever possible. They should include, where appropriate and maintainable, features such as rain gardens, permeable paving, and simple ways to treat runoff from roadway and sidewalk surfaces.

- Vibrant Walking Environment

Sidewalks should be comfortable, human-scaled, and vibrant with public art, cafes, benches, trees, awnings, and signage. They should be designed with inviting building entrances and transparent shop windows.

- Ease of Maintenance

Sidewalks should be durable and built with time-tested materials and features. They should be sustainable using locally-sourced and recycled materials where feasible. Maintenance responsibilities must be identified during the design process with a focus on reducing labor-intensive operations.



a. Sidewalk Zoning

The primary objective in designing sidewalks in the district is to provide a continuous system of safe, accessible pathways for pedestrians on both sides of all streets.

The sidewalk consists of three parts: the **Frontage Zone**, the **Pedestrian Zone**, and the **Greenscape/Furnishing Zone**. Although the boundaries between them can sometimes be blurred, each zone serves a distinct purpose in a street. Dividing the sidewalk into three distinct parts ensures that each will be given the detailed attention required to make the whole work together as an integrated system.

S-1-1. The Frontage Zone

The Frontage Zone is the area between the Pedestrian Zone and the street-wall. In locations where buildings are adjacent to the sidewalk, the Frontage Zone provides a buffer for pedestrians from opening doors and architectural elements. The Frontage Zone is the space for sidewalk cafes, store entrances, retail displays or landscaping, and it is important that these elements do not infringe upon the Pedestrian Zone.

>> The Frontage Zone should be maximized to provide space for cafes, plazas, and greenscape elements along building facades wherever possible, but not at the expense of reducing the Pedestrian Zone beyond the recommended minimum widths.

S-1-2. The Pedestrian Zone

The **Pedestrian Zone** is the area of the sidewalk corridor that is specifically reserved for pedestrian travel. It should be well-lit and functional in all weather conditions. This zone must be free of any physical obstructions to allow for unfettered pedestrian movement. Street furniture, plantings, outdoor seating, surface utilities, and other elements belonging to the Frontage Zone or Greenscape/Furnishing Zone should not protrude into the Pedestrian Zone.

The quality of the surface is of the utmost importance in the Pedestrian Zone. The surface material should be smooth, stable, and slip resistant, with minimal gaps, rough surfaces, and vibration-causing features.

>> The Pedestrian Zone should be clear of any obstructions including utilities, traffic control devices, trees, and furniture. When reconstructing sidewalks and relocating utilities, all utility access points and obstructions should be relocated outside of the Pedestrian Zone.

>> While sidewalks do not need to be perfectly straight, the Pedestrian Zone should not weave back and forth in the right-of-way for no other reason than to introduce curves. Meandering sidewalks create navigational difficulties for pedestrians with vision impairments.

>> In high volume, high density pedestrian areas, the Pedestrian Zone should be balanced with other Zones to accommodate large amounts of pedestrian traffic.

S-1-3. The Greenscape/Furnishing Zone

The **Greenscape/Furnishing Zone** is where street trees, stormwater elements, street lights, signage, hydrants, benches, bicycle racks, public art, trash and recycling receptacles, parking meters, transit stops, signal and lighting control boxes, and utility hatch covers should be located. As such, this zone collects the objects that may obstruct pedestrian flow, and simultaneously provides a buffer for pedestrians from the adjacent roadway. Vertical objects in the Greenscape/Furnishing Zone must be strategically placed to not obstruct sight lines, prevent damage from vehicles on the street, and to allow for access to and from parked cars.

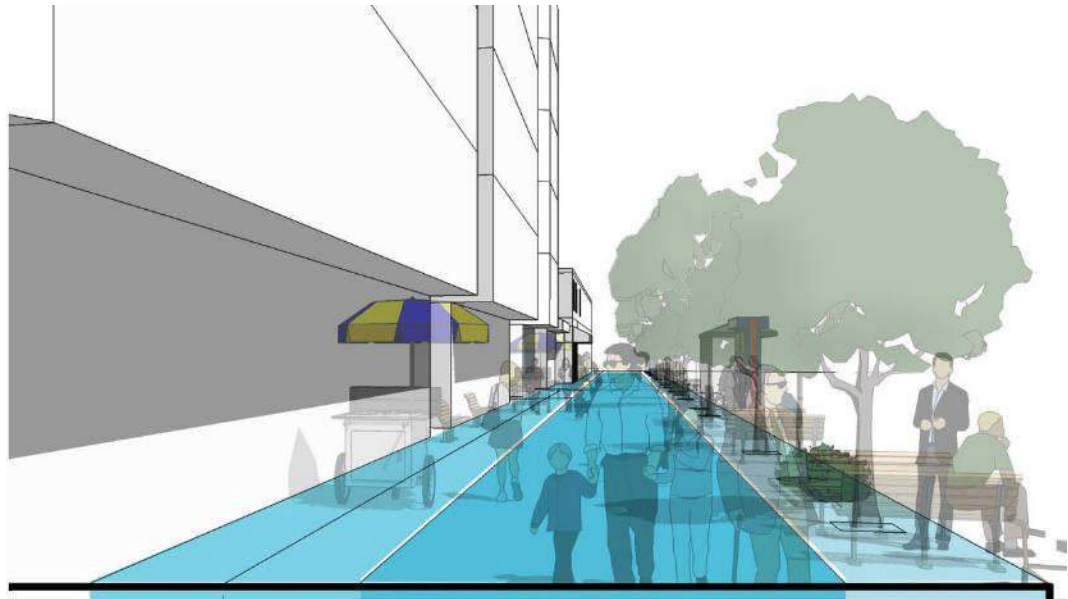
When curbs are moved to widen sidewalks or create curb extensions, all furnishings must also be moved so they do not encroach on the newly established Pedestrian Zone. Greenscape elements should be designed to make use of storm-water runoff from the sidewalk and/or the street.

>> Maximize the Greenscape/Furnishing Zone to provide as much of a buffer as possible between the Pedestrian Zone and adjacent street traffic; however do not reduce the Pedestrian Zone beyond the minimum recommended widths. When space is limited, parked cars and bicycle lanes can also serve as a buffer between the Pedestrian Zone and moving traffic.

>> For new developments and where opportunities are available to create a consistent setback, designs should accommodate wider sidewalks with generous Greenscape/Furnishing Zones.

>> On roadways without on-street parking and/or higher speeds, setbacks for vertical elements should be greater than about 0.5m where feasible.

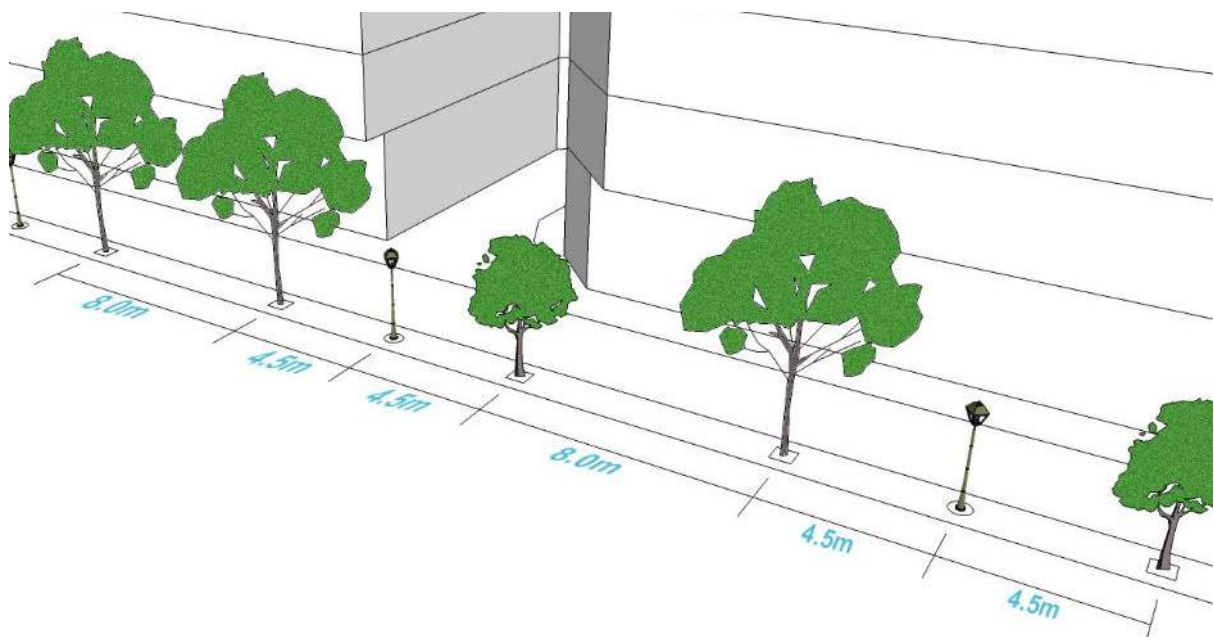
>> Consider traffic calming elements, such as curb extensions or chicanes where on-street parking is present, to provide more space for street furniture, trees, and other amenities.



	Frontage Zone setback ←	Pedestrian Zone			Greenscape / Furnishing Zone	
		Preferred	Preferred	Minimum	Preferred	Minimum
Downtown	about 1m	0.6m	3.0 m	2.4m	1.5m	0.5m
Neighborhood	about 1m	0.6m	1.5m	1.2m	1.2m	0.5m

S-1-4. Tree Siting and Spacing

Trees should be planted in locations that provide the best conditions for growth within a given design framework. Street tree plantings should strive for continuity along a street while respecting adjacent uses. Each tree should complement and not interfere with first floor uses, entryways, cafes, or other activities in the Frontage Zone. Trees should not be planted in loading zones or within 3m of bus stop landing zones. Tree limbs should be pruned to maintain sight lines and maximize visibility of the street wall.



b. Plaza

A plaza is a pedestrian space in the public realm built for enjoyment, lingering, and as a gathering place for special events. Plazas are encouraged as a part of all streetscape designs to create a sense of place and enliven sidewalks. Successful plazas attract people through the presence of others, and support a wide variety of activities including temporary markets, art installations, and/or performances. Plazas are also opportunities to incorporate the green and smart principles of these guidelines.

S-2-1. Making Plaza

They should be located adjacent to transit or other pedestrian generators wherever possible. Transitions between sidewalks and plazas should be as broad and seamless as possible to invite people to the space. Accessible routes must be maintained from the sidewalk and through the plaza to building entrances and transit stops.

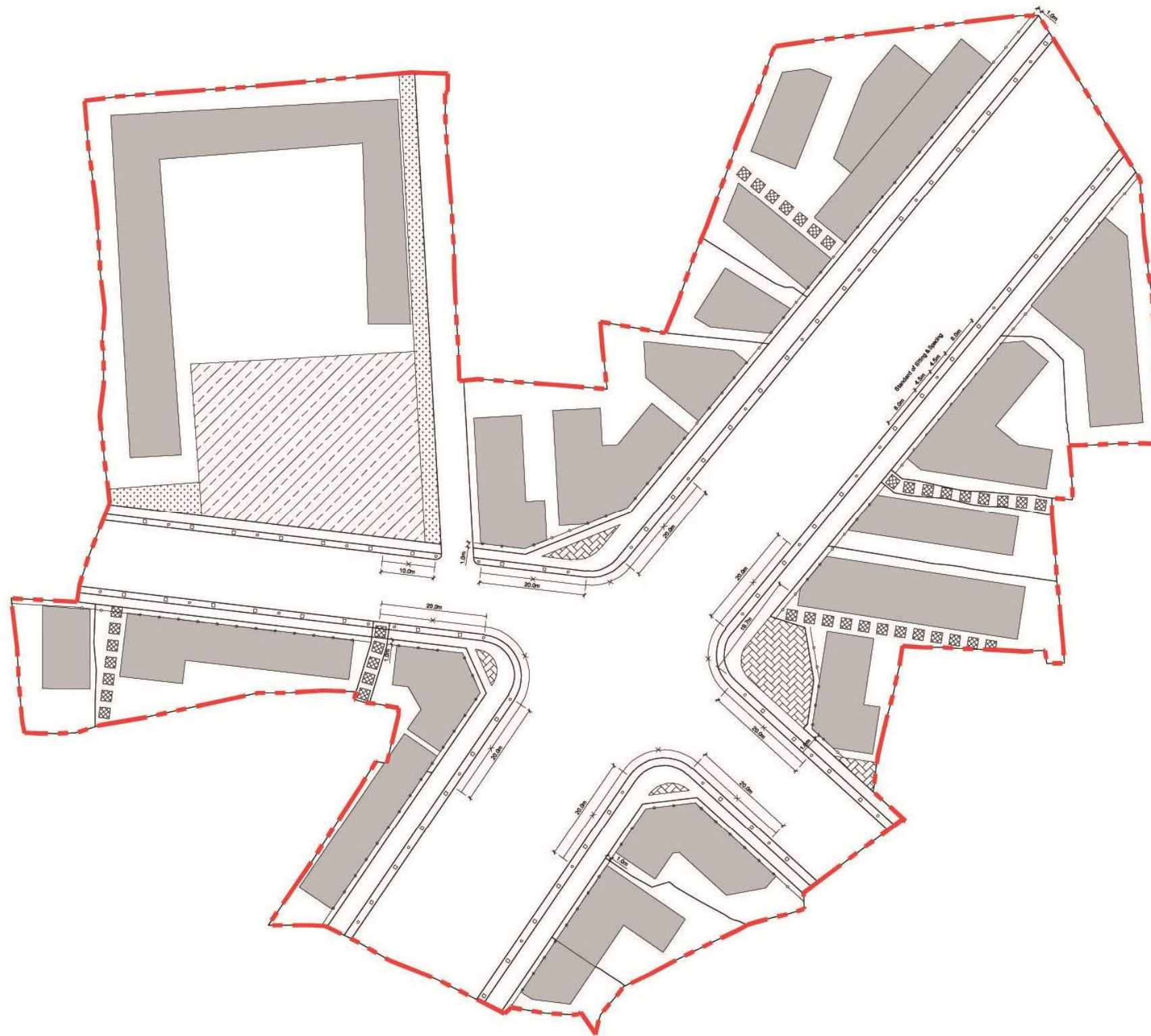
Plazas are excellent places to incorporate stormwater management elements. They should be as sustainable as possible and easy to maintain as they will require maintenance agreements.

Plazas should provide a variety of seating options, some of which may be movable. Seating can be incorporated into building edges, walls, and landscaping containers. Typically, dedicate at least 10% of a plaza's open-space to seating. Movable chairs provide ultimate flexibility for a public space and allow for variation in arrangements to suit personal preference, to capture sun or shade, or to sit in a group or alone.

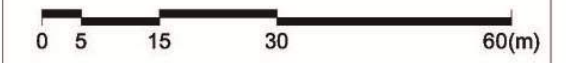


- Consider using permeable, recycled, and/or locally sourced materials to maximize sustainability. Subsurface recharge or storage for stormwater should also be considered.
- Space in plazas should be considered for bicycle parking.

- Adjacent businesses can provide food or services to make a plaza more inviting, as well as share responsibility as caretakers of the space.
- Designs should consider how the plaza will be used. Consider providing assembly areas for people to gather for performances and special events.



Sample of Urban design Guidelines



Design Guidelines

-  Prohibit Parking and Stopping
-  Designation of Street Wall
-  Public Path
-  Plaza
-  Play Ground (recommend)
-  Buffer Green
-  Tree & Lights Siting / Spacing

Annex-13.1: List of Consultation Meeting with Different Stakeholders of RAJUK Area

SN	Organization	Date	Venue
1	Bangladesh Institute of Planners (BIP)	18.01.2014	BIP Secretariat
2	Urban Development Directorate (UDD)/ National Housing Authority (NHA)	21.01.2014	UDD Bhaban
3	Dhaka South City Corporation	27.01.2014	City Corporation Bhaban
4	Bangladesh Poribesh Aandolon (BAPA)	27.01.2014	BAPA Office
5	BELA	28.01.2014	BELA Office
6	Center for Urban Studies (CUS)	01.02.2014	CUS Office, Lalmatia
7	Department of Environment (DoE)	03.02.2014	DoE Office
8	Department of Disaster Management	10.02.2014	DM Office
9	Narayanganj City Corporation (NCC)	18.01.2014	NCC Office
10	WASA	26.01.2014	WASA Office
11	Gazipur City Corporation	05.02.2014	GCC Office
12	Capital Development Authority (RAJUK)	19.02.2014	RAJUK's Board Room
13	Savar Pourashava	03.03.2014	Pourashava Office
14	Dhaka Transport Coordination Authority	06.03.2014	DTCA Office
15	Tarabo Pourashava	10.03.2014	Pourashava Office
16	Kanchan Pourashava	10.03.2014	Pourashava Office
17	Keraniganj Upazila	13.03.2014	Upazila HQ
19	BGMEA	19.03.2014	BGMEA Bhaban
20	Water Development Board (WDB)	12.02.2014	WDB Office
21	Bangladesh Railway (BR)	13.08.2013	BR Office
22	Bangladesh Inland Water Transport Authority (BITWA)	07.08.2013	BITWA Office
23	Institute of Engineers Bangladesh (IEB)	01.04.2014	IEB Bhaban
24	Roads & Highway Department	15.04.2014	RHD Bhaban
25	Institute of Architects Bangladesh (IAB)	03.05.2014	IAB Bhaban
26	Bangladesh Land Development Association (BLDA) and REHAB	18.01.2015	RAJUK's Board Room

BIBLIOGRAPHY

- ADB-AusAID-CUS (2010). City Cluster Economic Development: Bangladesh Case Study, prepared for Asian Development Bank, Manila, ADB.
- ADB-BBS, (2012). The Informal Sector and Informal Employment in Bangladesh, Country Report 2010, Dhaka: Asian Development Bank and Bangladesh Bureau of Statistics.
- Alam, M. J. (2011). Land and Housing Development Projects and Ensuing Externalities in the Built-environment: A Study in Dhaka, Bangladesh, PhD dissertation, Asian Institute of Technology, Bangkok.
- Ali, Ayub, M (2013). Informal Labour Force, Accumulation and Alienation State of Labor Force in Bangladesh: This report has been prepared as a chapter for a forthcoming book "Accumulation and Alienation : State of Labour in Bangladesh 2013", edited by Rashed Al Mahmud Titumir, published by Shrabon Prokashani, Dhaka in May 2013.
- Amin, A.T.M.N (1982) *An analysis of labour force and industrial organization of the informal sector in Dhaka*. Ph.D. thesis, Department of Economics, University of Manitoba.
- Amin, A.T.M.N (2000) *Transformation of waste into resources as a basis of building new urban community: An overview of regional experience*. A Keynote Speech Presented to the Regional Seminar on Community Based Solid Waste Management, Dhaka, Feb. 19 – 20.
- Amin, ATMN (1991). "Dhaka's Informal Sector and its Role in the Transformation of Bangladesh Economy", in Ahmad, S. U (ed.), *Dhaka Past Present Future*, The Asiatic Society, Dhaka, Bangladesh, pp. 446-470.
- Amin, ATMN (2010). The Informal Sector in Asia: Public Policy and Actions toward Decent Work (VDM, Saarbrücken Germany).
- Amin, ATMN and Alam, M J (2014a). Economy, Employment, Investment and Urban Land Price: Regional Economic Development Perspective, (*First Input*), Dhaka Regional Development Plan,
- Amin, ATMN and Sultana, S. (2013). The Informal Economy of Bangladesh: An Exploratory Study of Five Selected Sectors for Moving towards Formalization, Prepared for ILO Country Office, Dhaka.
- Amin, ATMN and Sultana, Shamima (2013). The Informal Economy of Bangladesh: An Exploratory Study of Five Selected Sectors for Moving towards Formalization, Prepared for ILO Country Office, Dhaka.
- BBS (2001). Preliminary Report of Household Income & Expenditure Survey – 2000. Dhaka: Ministry of Planning.
- BBS (2005). Labour Force Survey 2005, Bangladesh Bureau of Statistics, Dhaka.
- BBS (2007). Bangladesh Economic Census 2001-2003, Bangladesh Bureau of Statistics, p. 675.
- BBS (2010). Household, Income and Expenditure Survey (HIES) 2010, Bangladesh Bureau of Statistics.
- BBS (2010). Report of the Household Income & Expenditure Survey, 2010, Bangladesh Bureau of Statistics (BBS).
- BBS (2011) Population & Housing Census 2011, Preliminary Results; Bangladesh Bureau of Statistics, Government of The People's Republic of Bangladesh, July 2011.
- BBS (2011). Labour Force Survey 2010, Bangladesh Bureau of Statistics, Dhaka.
- BBS (2013). GDP of Bangladesh Economy, Bangladesh Economic Census 2013 Bangladesh Bureau of Statistics, Dhaka.
- BBS (2013). Statistical Pocket Book of Bangladesh 2012, Bangladesh Bureau of Statistics, Dhaka.
- BIDS (2012) Report of the Post Enumeration Check (PEC) of the Population and Housing Census, 2011; Bangladesh Institute of Development Studies (BIDS), April 2012
- Bogart, WT & Ferry, WC (1999). "Employment Centers in Greater Cleveland: Evidence of Evolution in a Formerly Monocentric City", *Urban Studies*, vol. 36, no. 12, pp. 2099-2110.
- BWDB (1996) The Dhaka Integrated Flood Protection Project- FAP 8A and FAP 8B; Centre for Urban Studies (CUS) (2006). Slum of Urban Bangladesh: Mapping and Census, 2005, Dhaka: CUS
- Chowdhury Md Zaber Sadeque, " The Housing Affordability Problems of the Middle-income Groups in Dhaka: A Policy Environment Analysis", Doctoral Thesis, The University of Hong Kong , August 2013
- Chowdhury, L. A. (2012). "Quality of Urban Life: Service Realities", in Rahman, H. Z. (Ed) *Bangladesh Urban Dynamics*, pp. 143-176, PPRC, Dhaka.
- CPD (2013). Bangladesh Economy FY2014, Center for Policy Dialogue, Dhaka.

- CPD, (2013). Bangladesh Economy http://www.slideshare.net/Tanvir777/the-overall-economic-condition-of-bangladesh?utm_source=slideshow02&utm_medium=ssemail&utm_campaign=share_slideshow accessed on 14.12.2013.
- CRDP (2014). City Region Development Planning Project (CRDP) data 2014
- DACCA Town Planning Report, 1917
- DCC (2005) Clean Dhaka Master Plan, DCC, 2005;
- DDA (2010) Delhi Master Plan, Delhi Development Authority, India, 2021
- Dhaka Bus Network and Regulatory Reform Implementation
- Dhaka Metropolitan Area Integrated Urban Development Project (DMAIUDP), 1981;
- Dhaka Sewerage Master Plan (Package DS-1A), DWASA, 2011;
- DIT (1960)DACCA Master Plan, 1959;Dhaka Improvement Trust.
- DMDP Structure Plan, Volume-I, Structure Plan (1995-2015);
- DMDP Structure Plan, Volume-II, Urban Area Plan (1995-2005);
- DMDP Structure Plan, Volume-III, Detailed Area Plan, DAP (2010-2015);
- DTCA (2011) Dhaka Urban Transport Network Study (DHUTS) by JICA, DTCA
- DWASA (2012) Storm Water Drainage Master Plan, DWASA;
- DWASA (2013) Dhaka Water Supply Master Plan, DWASA, 2013;
- Elisa Muzzini & Gabriela Aparicio, Bangladesh: Path to Middle Income from an Urban Perspective, The World bank, 2013
- Elisa Muzzini & Gabriela Aparicio, Bangladesh: Path to Middle Income from an Urban Formulation Land Development Controls and Procedures for Dhaka City, 1993;
- Gafur, S (2008). http://tutor2u.net/economics/content/topics/housing/housing_demand_supply.htm accessed on 11/10/2008.
- GoB (1993) Dhaka Integrated Transport Study (DITS), 1993;
- GoB (2010) Dhaka Urban Transport Network Development Study (DHUTS), 2010;
- GoB (2010) Road Master Plan of RHD, 2010
- GoB (2013) Annual Development Programme, 2013-2014;
- GoB (2013). *Bangladesh Economic Survey 2013*, Ministry of Finance, Government of Bangladesh, Dhaka.
- GoB (2013). Preliminary Report on Economic Census 2013, Bangladesh Bureau of Statistics (BBS), November 2013, P. 32.
- GoB (2013)Sixth Five Year Plan;Planning Commission, Ministry of Planning.
- GoB(1998) National Water Management Policy, 1998;
- GoB(2004) National Biodiversity Strategy and Action Plan for BGD, 2004
- GoB(2004) National Water Management Plan, 2004
- GoB(2009) Bangladesh Climate Change Strategy and Act Plan, 2009;
- GoB(2010) National 3R Strategy for Waste Management, 2010;
- GoB(2010) Perspective Plan of Bangladesh, 2010-2021;
- GoB(2011) National Urban Sector Policy, 2011 (Draft);
- GoB(2013) Bangladesh Water Act, 2013;
- HAD (2010) Metropolitan Development Plan-2031 for Hyderabad Metropolitan Region.Tamilnaru,India, <http://esa.un.org/unpd/wup/CD-ROM/>
<http://esa.un.org/wpp/Excel-Data/population.htm>
- Islam, M. S. and Khan, M. N. U, (2012). "Urbanization: Spatial Dynamics", in (edited), H.Z. Rahman, *Bangladesh Urban Dynamics*, PPRC, Dhaka, pp. 11-49.
- Islam, Nazrul, & Shafi, Salma A.(2008)"A Proposal for a Housing Development Programme in Dhaka City. CUS, Dhaka; Project under M/O Housing and Public Works.
- Islam, Nazrul.(2005) "Dhaka Now: Contemporary Urban Development". Bangladesh Geographical Society (BGS), Dhaka.
- John Jones(1992) Working Paper No. PT/4: Preliminary Growth Options, DMDP, July 1992
- John Jones, Working Paper No, PT/4: Preliminary Growth Options, DMDP, July 1992;
- Kabir A. (2013).The Urban Spatial Structure of Employment and Its Impacts on Transportation and Urban Development: A Case Study of Dhaka, PhD Thesis University of New South Wales, Australia.
- Kazekami, Sachiko (2011). Changes in Informal Employment: Evidence from Asian Productivity Organization Member Countries, APO Working Paper Series No. 1, p. 9.
- KDA (2010) Kuala Lumpur Structure Plan, Kualalumpur, Malayasia 2020
- KDA(2010) Karachi Master Plan, Karachi Development Authority, Pakistan,2020

LOS ANGELES CITY GENERAL PLAN, Los Angeles, California, USA

Makathy, T.(2008).“Policy Adjustment for Managing Unplanned Land Sub-division Development in an Immature Planning, Phnom Penh, Cambodia”. PhD Dissertation, Department of Urban Engineering, Graduate School of Engineering, The University of Tokyo Japan, Chapter 3 : 2-23.

Mayo, S. K. (1998). “Land Prices, Land Markets, and the Broader Economy”, *Land Lines*,10(2), pp.?

McAuslan, P. (1999). “Housing Tenure, the Urban Poor and the Law in Bangladesh: Implementing the Habitat Agenda”, edited Islam, N (2000) *Urban Land Tenure and Urban Housing Finance in Bangladesh*, CUS, Dhaka for UNCHS (Habitat), pp 38-115.

Metropolitan plan for Sydney, Sydney, Australia 2036

Muzzini, E and Aparicio, G. (2013). *Bangladesh:The Path to Middle-Income Status from an Urban Perspective*, The World Bank, Washington DC.

NSW Govt., Metropolitan Plan for Sydney 2036;

NSW Govt., Metropolitan Plan for Sydney 2036;

Rahman, Md. Taibur, “ Urban Governance and Informal Growth Regulation in Dhaka”. Dhaka. A H Development Publishing House, 2013.

RAJUK (1997). Dhaka Metropolitan Development Plan, Vol 1: Dhaka Structure Plan, 1995-2015.

RAJUK, DMDP Vol-I, Dhaka Structure Plan (1995-2015), December, 1995

RAJUK, DMDP Vol-I, Dhaka Structure Plan (1995-2015), December, 1995;

Rouse, Jonathan, (2004). Absorbing informal-sector entrepreneurs into improved urban services, *Small Enterprise Development, An international journal of micro finance and business development*, Vol. 15, No. 2, June, pp. 1-10.

Seraj, T.M. (2007). *Future of the Private Real Estate Industry and Actions Needed*, Paper presented on the occasion of REHAB Fair, November 19, Dhaka, Bangladesh.

Seraj, T.M. (2007). Future of the Private Real Estate Industry and Actions Needed, Paper presented on the occasion of REHAB Fair, November 19, Dhaka, Bangladesh.

Seraj. Toufiq M., Seminar Paper on “ Prospect of Real Estate Sector in Bangladesh”, REHAB seminar, March, 2014.

Shams, M. T. (2014). ‘Analyzing the nexus between structural transformation and female labour force participation in the context of Bangladesh’ Masters Thesis, Department of Economics, North South University, Dhaka, Bangladesh.

Sheltech, (2010). Data gathered from Sheltech Pvt. Ltd, Dhaka.

Tanvir (2013).The overall economic condition of Bangladesh, http://www.slideshare.net/Tanvir777/the-overall-economic-condition-of-bangladesh?utm_source=slideshow02&utm_medium=ssemail&utm_campaign=share_slideshow accessed on 14.12.2013.

Tanvir (2013).The overall economic condition of Bangladesh, http://www.slideshare.net/Tanvir777/the-overall-economic-condition-of-bangladesh?utm_source=slideshow02&utm_medium=ssemail&utm_campaign=share_slideshow accessed on 14.12.2013.

Taslim M. A. and Khan, Akib, (2012). “Industrial Growth and Location Dynamics, Bangladesh Urban Dynamics”, in (edited), H.Z. Rahman, *Bangladesh Urban Dynamics* , PPRC, Dhaka, pp. 50-78.

The Daily Star, (2013).<http://archive.thedailystar.net/newDesign/news-details.php?nid=212485> accessed on 15.12.2013.

The Daily Star, (2014). The National Daily English Newspaper, March 30, 2014.

The World Bank, (2007). ‘Dhaka: Improving Living Conditions for the Urban Poor’, *Bangladesh Development Series Paper No. 17*, The World Bank Office, Dhaka June 2007, a Document of World Bank.

UN (2013) World Population Prospects: The 2012 Revision; Dept. of Economic & Social Affairs, UN, 2013

UN HABITAT (2013) Global Report 2013

UN HABITAT(2001) Global Report 2009

UN HBITAT (2013) Urban Planning for City Leaders, UN HBITAT, 2013

UN-Habitat (2009) Global Report on Human Settlement, “Planning Sustainable Cities”, 2009;

UN-Habitat, Global Report on Human Settlement, “Planning Sustainable Cities”, 2009;

Web, (2010). http://www.myrepublica.com/portal/index.php?action=news_details & news_id=142 accessed 10/04/10 (Kolkata land price).

World Bank (2007). Dhaka: Improving Living Conditions for the Urban Poor.

World Bank (2007): World Bank Bangladesh Development Series Report, 2007, p. 126.

World Bank (2013). "Dhaka Holds Opportunity for Many" (Chapter 2), *Employment and Poverty*, <http://siteresources.worldbank.org/BANGLADESHXTN/Resources/295759-1182963268987/ch2.pdf> accessed on 3.12.2013

www.bbs.gov.bd/webtestapplication/userfiles/image/National%20Accounts%20Reports/GDP/GDP_2011-12%20%28p%29.pdf accessed on 15.12.2013

