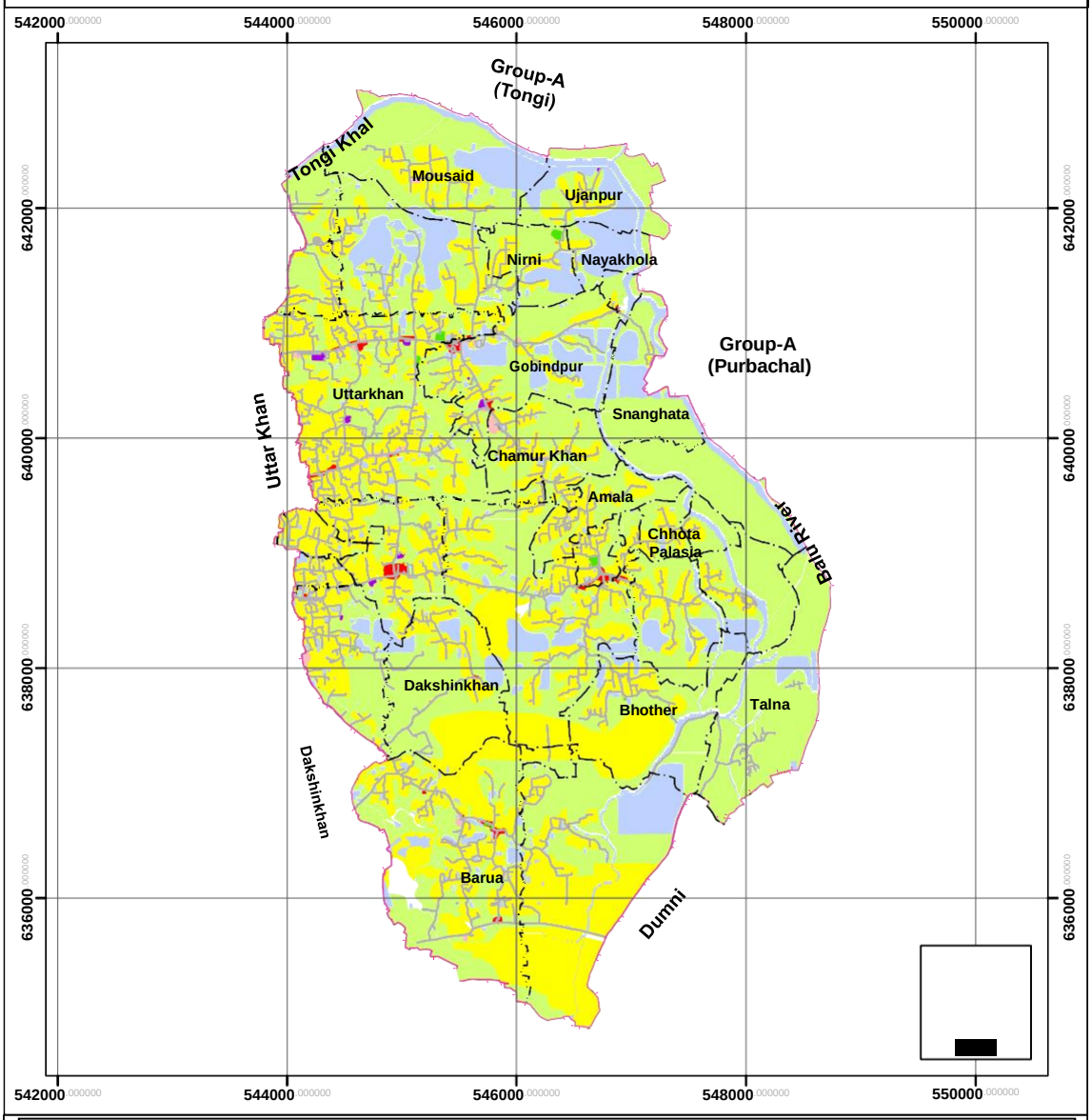
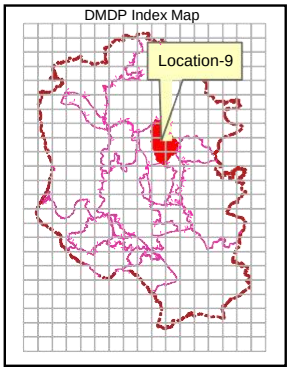
Map 3-1: Existing Landuse of Location-9 Area



Preparation of Detailed Area Plan (DAP) for DMDP Area (Location-9]



0 600 1,200 2,400 3,600 4,800 Meters

Legend

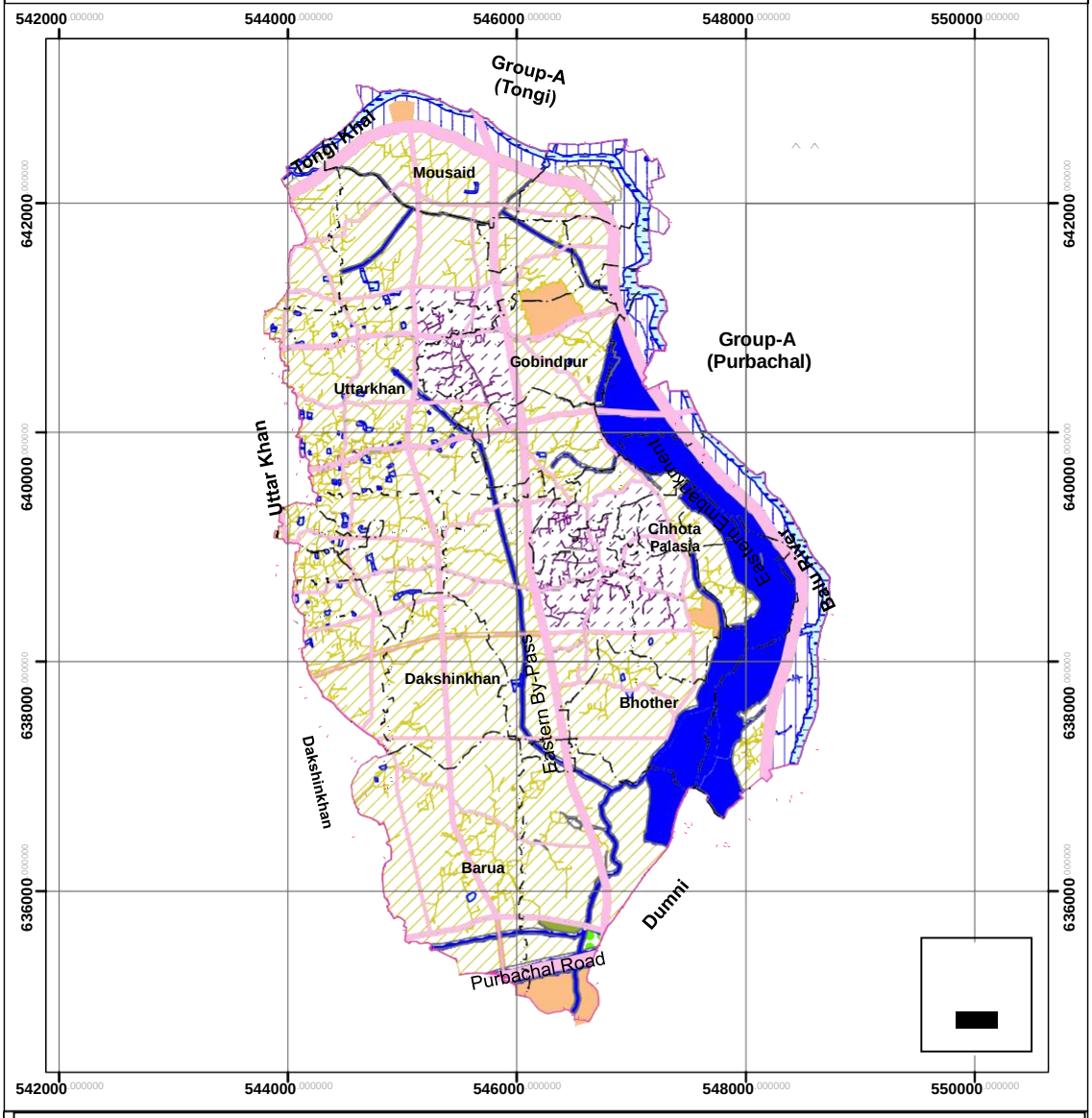
- Group boundary
- Mauza boundary
- Mauza Sheet boundary
- Existing Road
- Existing waterbody

Existing Landuse Categories

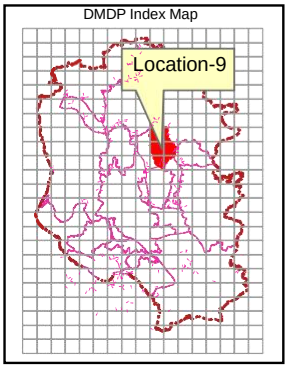
- Agriculture
- Commercial Activity
- Community Service
- Education & Research
- manufacturing & processing
- Mixed Use
- Recreational Facilities
- Residential
- Service Activity

Source: Landuse Survey, 2005/2006

Map 3-2: Proposed Landuse of Location 9 Area



Preparation of Detailed Area Plan (DAP) for DMDP Area (Location-9)



0 600 1,200 2,400 3,600 4,800 Meters

Legend

- Group boundary
- Mauza boundary
- Sheet boundary

Proposed Landuse categories

- Administrative Zone
- Agricultural Zone
- Commercial Zone (Business)
- Commercial Zone (Office)
- Flood Flow Zone
- General Industrial Zone
- Heavy Industrial Zone
- Institutional Zone
- Mixed Use Zone (Commercial-General Industrial)
- Mixed Use Zone (Residential-Commercial)
- Mixed Use Zone (Residential-Commercial-General Ind
- Mixed Use Zone (Residential-General Industrial)
- Non-Conforming Use
- Open Space
- Overlay Zone
- Proposed Road Network
- Rural Settlement Zone
- Transportation & Communication
- Urban Residential Zone
- Water Retention Area
- Waterbody

Source: Landuse Survey, 2005/2006

i) Bridges, Culverts and Box Culverts

These structures are provided at places wherever roads cross the drainage network system. Such structures are built with the roads to provide free passage of drainage water and sometimes to provide navigation/ boat passages. Consequently, the conflict between drainage and road networks is mitigated. Figures below show bridge and culverts in such system.

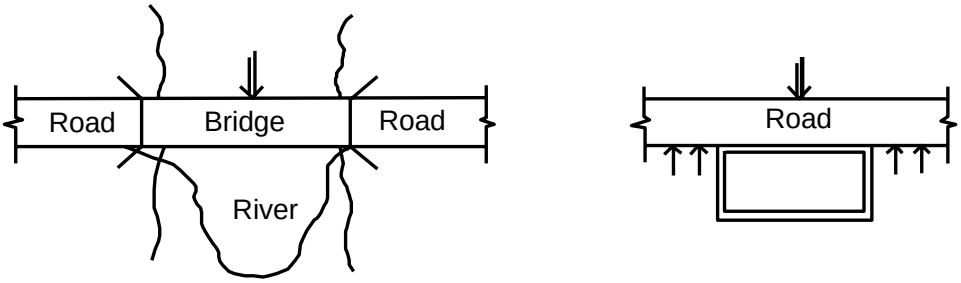


Figure 3-1: Typical Sketch of Bridge and Road

Physical features survey, field survey for river, khal/ drainage etc. are conducted in the project and base maps are prepared. The details of the bridges, culverts and box-culverts are available in the mouza maps. Also data base are prepared showing dimensions and existing conditions of these structures.

ii) Drainage Sluices, Pipe Sluices and Siphons

Drainage sluices, pipe sluices and siphons are provided on the embankments. Embankments protect the area from floods coming from outside rivers and make the project area flood free. However, storm water from rainfall-runoff within the area causes localized flood, drainage congestion and submergence. A sketch below shows a few of such structures.

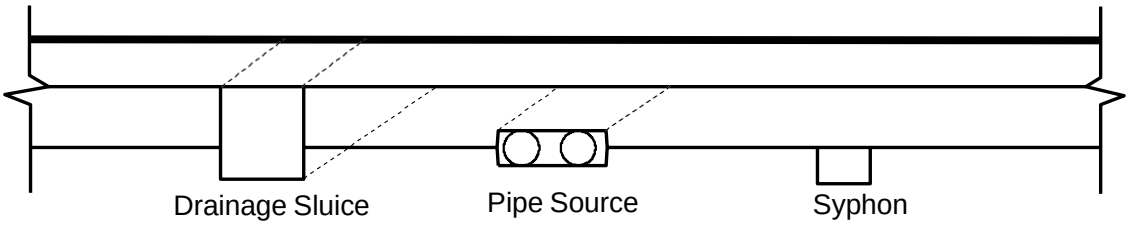


Figure 3-2: Dyke of Road Embankment

A schematic view of Drainage sluice, pipe sluice and siphon on embankment, which relieve drainage congestion. Physical feature survey maps and field survey maps provide location & details of these types of structures.

iii) Flood Protection Embankments and Flood walls

Urban areas need protection from flood from the neighboring rivers. Unprecedented flood of 1988 in Dhaka city necessitates the study to protect urban area, and Flood Action Plan-FAP study and findings recommended FAP-8A and FAP-8B embankments and major drainage related infrastructures. FAP-8B recommended immediate need to protect major urban areas of Dhaka city, which needs to be implemented by constructing embankment from Tongi Bridge to Lalbag Thana with pump stations, drainage sluices and gates etc. The existing Buckland Bundh and the Pragati Sarani from Buriganga first bridge to Tongi creates natural barrier for flood from the Balu and Lakkha River. However, according to FAP-8A, embankment as proposed to protect new areas never been built and Dhaka east areas remained unprotected from external flood. Physical infrastructure survey and field survey have covered these items, the maps prepared from survey, and database so prepared represent detailed information. The sketch below gives some idea about Flood Embankments and Floodwalls.

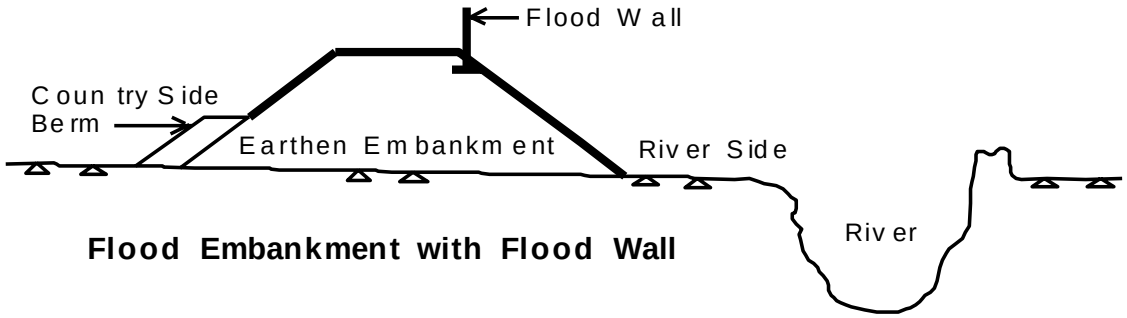


Figure 3-3: Flood Protection Embankment and Flood Wall

iv) Sluice Gates, Regulators and Navigation Locks

These types of structures are provided on the flood control embankments. Sluice gates function to vent out water from the countryside to the river. Flap gates are generally installed in the riverside so that river water cannot enter into country or project side. On the other hand, whenever the river water level is low and countryside water level is high, countryside water drains out through sluice.

Regulators also serve the similar purpose as sluice gates, however the size of regulators are much bigger than sluice gates. Regulators may have control gates in the countryside and in the riverside. The drainage of water to the river or flashing of water into countryside are possible by operating simultaneously countryside and riverside mechanical gates. Navigation lock sometimes is provided on the flood embankment to allow boat and ferry passages from the river and from the countryside. It is a simple structure with bigger chamber and large lift gates both at riverside and at countryside. By operating these gates, boats and river crafts can be transferred from the river to countryside and vice versa. Physical features survey and field survey have covered these items if available in the project, maps prepared from survey and database so prepared will show these features in detail.

v) Flood Protection and Drainage Infrastructures

In Location-9 project area, primarily present nearby area of Dhaka City, consisting 18 mouzas (part and full) and part of SPZ- 13.2 are not fully developed. Location-9 area is surrounded Turag River. The ingress of flood from the river submerges majority of the areas under Location-9. The flood of 1988 was extremely high and its duration was very long. As a result, most of the areas were severely flooded. In order to protect the entire area from such flood, FPCO, BWDB, DWASA proposed to build flood protection embankment around Dhaka city.

There is a proposed project namely "Dhaka Integrated Flood Control Embankment cum Eastern by Pass road multi-purpose Project" covering an area of 124 sq km. and bounded by the Balu river at the East

Other Major Infrastructure Elements

Drinking water municipal supply

The project area is mostly rural in nature, and rural landuse categories are the main land use for the area. The area is at the periphery of Dhaka City area and is comparatively less developed. Still there are large vacant areas, low-lying areas, and agricultural land areas. Municipal water supply is not ensured but some of these areas have water supply from deep tube wells. Information leading to drinking water supply are collected from the secondary sources from the existing DWASA and municipal and Thana offices. In the rural area, drinking water is available from domestic hand tubewells and in some cases from deep tube wells (Agriculture), river and ponds.

Sewage Treatment Plant

There is no sewage treatment plant for Location-9 area. Septic tanks are used for household, institutional and commercial buildings. In the area, poor people use hanging latrines for this purpose. As a result, the open water bodies, drainage khals and river water used to be highly polluted by human fecs and waste.

Deep Tubewells

Water supply for drinking water is collected from deep tube wells. Even in the rural areas there are deep tube wells used for irrigating of agriculture lands. Detail information is collected from physical feature survey and field surveys and are available in the maps prepared from the survey and database. Policy RS/4 – River pollution control details of the Lakkhya and its tributaries, the Balu River etc. are available from Structure Plan (SP).

Agriculture

Planning area in Location-9 encompasses about 6167.91 acres of land. Out of total 6167.91 acres about 3140.58 acres are fully agricultural area and remaining are semi urban and rural land. Some agriculture lands are low lands that remain flooded in monsoon season. These areas are flood flow and sub-flood zones of the Balu River and their tributary and distributary khals, where any development other than agriculture, fisheries, cause-ways, landing stations and brick fields is restricted. Strategic plan policy RS/1- areas of high agricultural value, reasons and means of implementation clearly specify and discuss the issues, in page 50 of the Structure Plan.

Flood Flow and Sub Flood Flow Zones

A river in its flow regime maintains a width within which the flood flows and sub-flood flows occur during flooding time. The rivers and flood plains play an important role in both the ecology and economy of the region. Land development within the designated flood plain areas requires control to avoid obstruction to flood flow, which might otherwise result in adverse hydraulic effects like rise of flood water levels, and changes in flow direction.

The Main flood-flow zone is the cross sectional area of a river that carries the dominant flood flow whereas sub-flood flow zone is the zone that carries the less frequent and high magnitude flood in a season. The schematic diagram in Figure 3.4 shows the theoretical flood flow zones of a river.

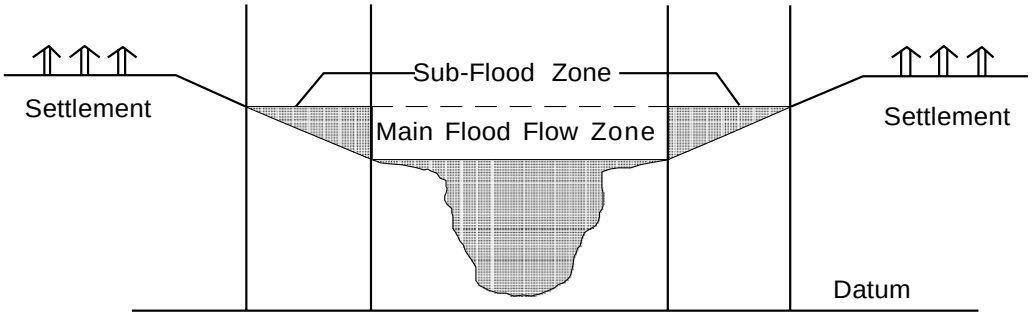


Figure 3-4: Cross Sectional View

Policy RS/3-flood flow zones and sub-flood flow zones describes reason, means of implementation etc. in STP and rural and special areas policies. Turag and Balu river related to Location-9 planning area.

Water Protection and Nature Preservation Zones

River pollution control from anticipated urban growth is done by augmenting supply of potable water from artisan sources. The relatively unpolluted Turag has tremendous potential for this and needs necessary environmental protection. Policy RS/4 River pollution control suggests to prevent pollution of the Turag River and its tributary and the Balu River to ensure a long-term source of potable water for Dhaka city by Saidabad water treatment plant. In addition, it suggests means of implementation by controlling settlement growth from Demra to about 10 km upstream along the Balu and the Lakkha River.

3.1 Proposed Infrastructure Development

Urban Fringe Area

In urban fringe areas, low initial densities will make cost-effective levels of service provision difficult to achieve. In this regard, eventual higher densities should be taken into account in the design of levels of initial service provision. In the initial planning period, it will be necessary to safeguard the alignments and ROWs of all primary, secondary and tertiary roads and provide infrastructure service to reserve existing khals, waterways and retention ponds where possible. This will be necessary to ensure that the rational and phased development of the Structure Plan proposals is not compromised in

the short-term.

Urban Core Area

In older established areas, densities will reach in levels higher than previously or currently planned for. Consequently, capital investment programs and design proposals for levels of service provision should be based on much higher population and density levels. Acknowledging the core area in the city's economy, the DAP adopts a strategy of selective and gradual change. These are mentioned in the next page:

- The improvement and upgrading of access to and within the area, with particular emphasis on traffic management
- To promote comprehensive redevelopment as a means of upgrading existing infrastructure provision on an area basis, in partnership with the private sector where appropriate and feasible
- To promote comprehensive community based rehabilitation of slum and squatter areas and areas poorly served with infrastructure and social and community services, through participatory and advocacy and planning initiatives involving the community, CBOs and NGOs
- To limit piecemeal, specific site-by-site redevelopment to a scale commensurate with the capacity of existing public rights-of-way and levels of existing infrastructure services provision

Difference between Existing and New Urban Area

In existing urban areas the density of population is high, roads are narrow and congested, utility services are insufficient, less possibility of horizontal expansion due to scarcity of land, paucity of social and community facilities, inadequate and poorly maintained infrastructure and ever-increasing costs for ever-diminishing space. On the other hand, in the new urban areas, the density of population is low, roads are wide, and exists more scope for development through horizontal expansion.

Utilities

Following strategies will be followed for development of utility services in the project area:

- To reduce cost of development services the development of utility services should promote in phases based on comprehensive plan for the demarcated entire new urban areas
- Only those areas will be targeted in new urban areas where the urbanization is likely to be rapid and imminent
- Except water supply and waste disposal, all other services will be left with concerned service giving agencies
- Conserve the drainage and all other natural canals and water courses
- Encroachment should be prohibited in both sides of rivers and canals
- Primary, secondary and tertiary drains should be maintained by private organizations, NGOs and CBOs

Sub Area

With the growing demand for land, indiscriminate spatial growth in high lands is taking place at an accelerated rate. Present trend shows the main thrust of growth has been in the eastern fringe areas. The more outlying areas that are going to be urbanized spontaneously or in a planned way tend to grow very slowly. As a result, the costly infrastructure facilities and services that have to be provided are under used and even lay idle for a long period.

Promoting development strategy for this urban sub area needs to adopt appropriate policies, which will accelerate development at specific locations. The purpose of these policies is to optimize the utilization of these extensive but scattered and under-utilized lands, as well as promotion of further outward planned urban growth.

Circulation and Transport Network

The review of land use pattern of Location-9 shows that the most dominant land use is agriculture, which is about 50% of the total land. The second major land use is residential and occupying about 33 % of the project area. Beside these, about 10% open area, about 4% water body and others are negligible. Land use under roads is only 1.3%.

The review of the physical feature survey of existing road networks revealed that various types of road exist having different width and without any proper circulation pattern. There are different categories of roads like pucca, semi-pucca and kutcha roads in the project area. The total length of pucca roads is 31.52 km. The condition of pucca roads is not same in all locations in the project area. Some of these roads are good and some are in poor condition. The next category of the roads is semi pucca, or brick soling road, which have been identified as of almost similar in character in the whole

project area. The length of semi pucca roads is about 30.31 km. The significant portion of the roads of the project area is kutcha road, and its length is about 73.22 km.

The analysis of circulation network shows that there is no proper circulation pattern in the project area. The important roads of this area are Medical Road, Shonar Khola Road, Hafizuddin Road, Borua Road etc. Although these roads are performing as arterial road networks for this location, the width is not up to the demand. As the proportion of residential, industrial and mixed uses are low, transport network have not been properly developed. Tertiary and access roads are also inadequate and very narrow. Again all the existing roads do not follow any proper circulation pattern.

In order to address the circulation problems, first initiative is to establish arterial road networks proposing some new roads and filling up the missing links considering the proposed land use. DMDP Structure Plan recommended a number of roads to be established as arterial road networks in this area. All of the proposals recommended in Structure Plan were also taken in recently developed Strategic Transport Plan (2006). The proposals made in DMDP, STP has been incorporated, and some new roads have been suggested in DAP. After establishing arterial road network, internal roads have been suggested in the neighborhood level in such a way so that a gridiron pattern has been developed and mobility will be easier. All the proposed roads are shown in Table 3-9 and 3-10 (Details are shown in **Annexure-II**) and **Map 3-3**.

Table 3-9: STP Proposed Road

Road Id	Road Name	Width (in ft.)	Width (in m.)	Area (in m^2)	Area (in Acre)
1	Khilkhet to Eastern By-pass	Duel 2 lane (80ft)	24.40	100936.00	24.942
2	Khilkhet to Eastern By-pass	Duel 2 lane (80ft)	24.40	2.80	0.001
3	Uttara 8 to Balu River	Duel 2 Lane (80ft)	24.40	70469.76	17.413
4	Uttara 4 to Balu river	Duel-2 Lane (80ft)	24.40	76705.77	18.954
5	Eastern By-pass	Duel 2 lane (300ft)	91.50	737451.03	182.228
Total				**985565.36**	**243.538**

Source: Proposed by Consultants

Table 3-10: Proposed Road of Location-9 Area

Serial No.	Road Type	Road Name	Width (Feet)	Width (Meter)	Length (Km.)	Area (M^2)	Area (Acre)
1	Secondary	Master Para - Gobindapur, Via: Munda, Moynartek	60	18.29	4.029	49158.704	12.147
2	Secondary	Gobindapur - Aktar Tek, Via: Kachkura, Barobari, Chamur Khan	60	18.29	3.461	42225.737	10.434
3	Secondary	Uttarkhan Parbata to Charmurkhan	60	18.29	0.533	6496.610	1.605
4	Secondary	Maserpara to Eastern Embankment	60	18.29	2.700	32940.927	8.140
5	Secondary	Moynartake to Eastern Embankment	60	18.29	0.798	9740.541	2.407
6	Primary	Mausaid - Barua	120	36.58	7.306	178201.559	44.035
7	Secondary	Barua, Lahunia to Eastern Embankment	60	18.29	5.572	67973.410	16.797
8	Secondary	Betuli to Beparipara Kachkura road	60	18.29	0.898	10961.029	2.709
9	Secondary	Betuli to Gobindapur - Aktar Tek Road	60	18.29	0.380	4641.636	1.147
10	Secondary	Kachkura bazar to Palasia	60	18.29	0.728	8887.297	2.196
11	Secondary	Palasia to Eastern Embankment	60	18.29	0.395	4824.856	1.192
12	Secondary	Borobari to Eastern Embankment	60	18.29	0.997	12160.606	3.005
13	Secondary	Dakshin Khan, Islambagh to Sonarkhola	60	18.29	1.477	18021.742	4.453
14	Secondary	Eastern by Pass North - Barua Uttar Para, via: Holan bazar, Modhubag	60	18.29	6.260	76374.306	18.873
15	Secondary (Arterial)	Dakshin Khan Sardar Bari - Kachkura Batoria, via: Dobadia Dakhin Bazar, Kachkura	80	24.38	4.486	54724.710	13.523
16	Secondary	Munda - Barua, via: Chan Para, Uttar Khan Madda Para, Badda	60	18.29	6.886	84014.373	20.760
17	Secondary	Mainertak (STP: L55) - Ratuti (STP: L5)	60	18.29	3.246	39597.406	9.785
18	Secondary	Ratuti (STP: L5) - Pink City	60	18.29	2.914	35553.155	8.785

19	Secondary	Masterpara road to Charmurkhan Road	60	18.29	1.945	23731.391	5.864
20	Secondary	Gajnavi Road to Dabodia Sign Board Road	60	18.29	1.493	18219.529	4.502
21	Secondary	Dabodia Sign Board Road to Chamurkhan purbapara	60	18.29	1.650	20127.011	4.973
Total			**--**	**--**	**58.154**	**798576.535**	**197.332**

Note: 'P' indicates Primary Road and 'S' indicates Secondary Road.

Following strategies will be adopted to promote circulation in the project area:

- A comprehensive road network should be prepared for the entire project area using a hierarchy of road network
- In case of local roads, a participatory approach should be developed to realize at least a part of the cost of development from the beneficiaries. This should also help in reducing cost involved in land acquisition for road development
- Proposed roads in these areas should be chosen for immediate development that is needed to promote growth in that area
- Incremental development approach should be adopted to get rid of unnecessary costs in development of roads that should remain underutilized
- Service roads should be created along major roads to allow free flow of long distance traffic

Flood Protection and Drainage

Location-9 Area is surrounded by the Turag and Balu rivers. The area becomes subject to flooding whenever these rivers rises above flood level. Unprecedented flood in 1988 and 1998 submerged about 80% of the area. Flood Action Plan (FAP) committee recommended for protection of Dhaka City from severe floods under FAP-8 study group. FAP-8 has two components FAP-8A and FAP-8B embankments. FAP-8B embankment has been constructed by the assistance of Government of Japan and ADB. This part of embankment can protect mainly DCC area. When FAP-8A embankment will be implemented, it will protect Dhaka city area in the east (e.g. Location-9). FAP- 8A embankment will begin from Tongi Bridge, will follow Tongi River and the Balu River, and will end at Demra near the confluence of the Balu and Sitalakkhaya River.

Flood protection by embankment creates special situation for providing internal drainage from storm water. Drainage problem so created is solved by special drainage related structures such as network of drains and khals, culverts, sluice gates, regulators, reservoirs, retention ponds, pump stations etc. The following strategies should be adopted to improve flood protection and drainage system**:**

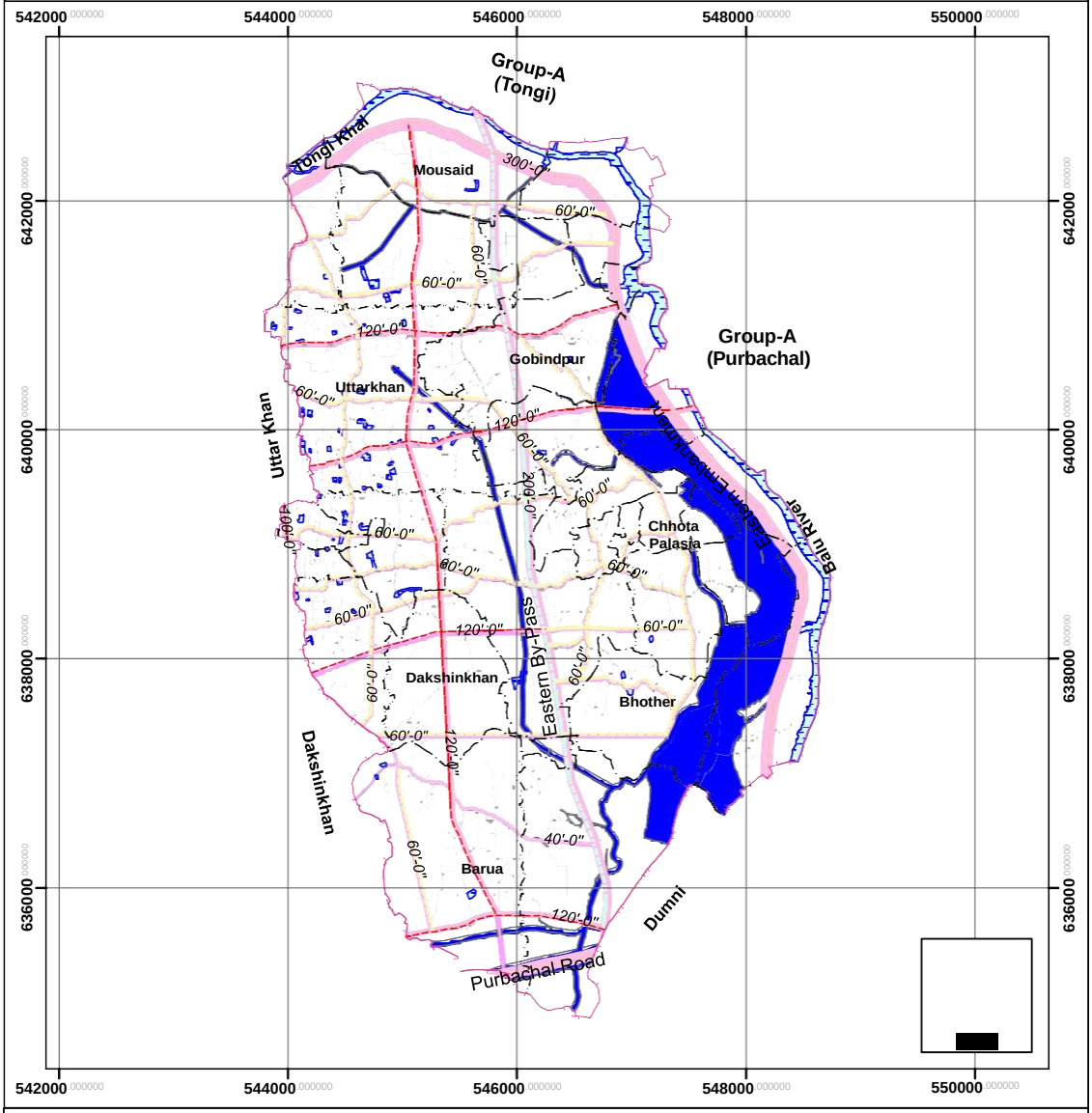
- To protect the drainage system all natural canals and watercourses should be preserved
- As a measure of protection from encroachment, restrictive buffer zone should be created on both sides of natural canals, rivers and other watercourses. Walk way and plantation should be created along these buffer zones
- Cost of primary drainage system developed in housing estates by public sector agencies, which should be realized from the developers

Water Logging

Most of the time during monsoon, water level in the river remains higher than the terrain inside the project area. This implies that the existing drainage depends very much on the water levels of the peripheral river systems. Hence, standard draining by gravity may not always be possible. In order to facilitate and improve drainage it is considered to install drainage pumps at some of the FCD structures connecting to the rivers. An integrated and cost efficient approach should be provided for planning and management of the drainage system of the project area in the future. The developed technology can easily be transferred and applied to catchment areas experiencing similar problems.

During the monsoon (May to October), the drainage of the area is mostly dependent on the water levels of its peripheral river systems. During this period, river water levels generally remain higher than the internal drainage level. This major constraint to the effective surface drainage within the area is aggravated by the wide range of rainfall intensities that prevail during the monsoon period. The situation worsens when monsoon runoff generated from short duration and high intensity rainfall coincides with high water level in the river systems.

Map 3-3: Proposed Road Network in the Study Area



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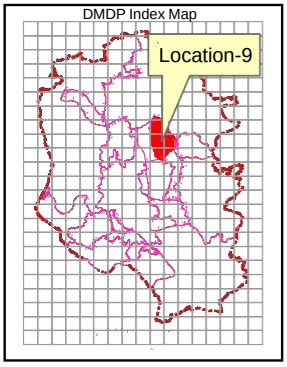

0 600 1,200 2,400 3,600 4,800 Meters

Legend

Group boundary	**Proposed Landuse categories**	**Proposed Road (Width-Ft)**	120'-0"
Mauza boundary	Proposed Road Network	300'-0"	100'-0"
Sheet boundary	Transportation & Communication	200'-0"	60'-0"
	Water Retention Area	170'-0"	40'-0"
	Waterbody		

Source: Proposed by Consultants