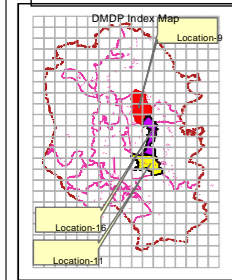
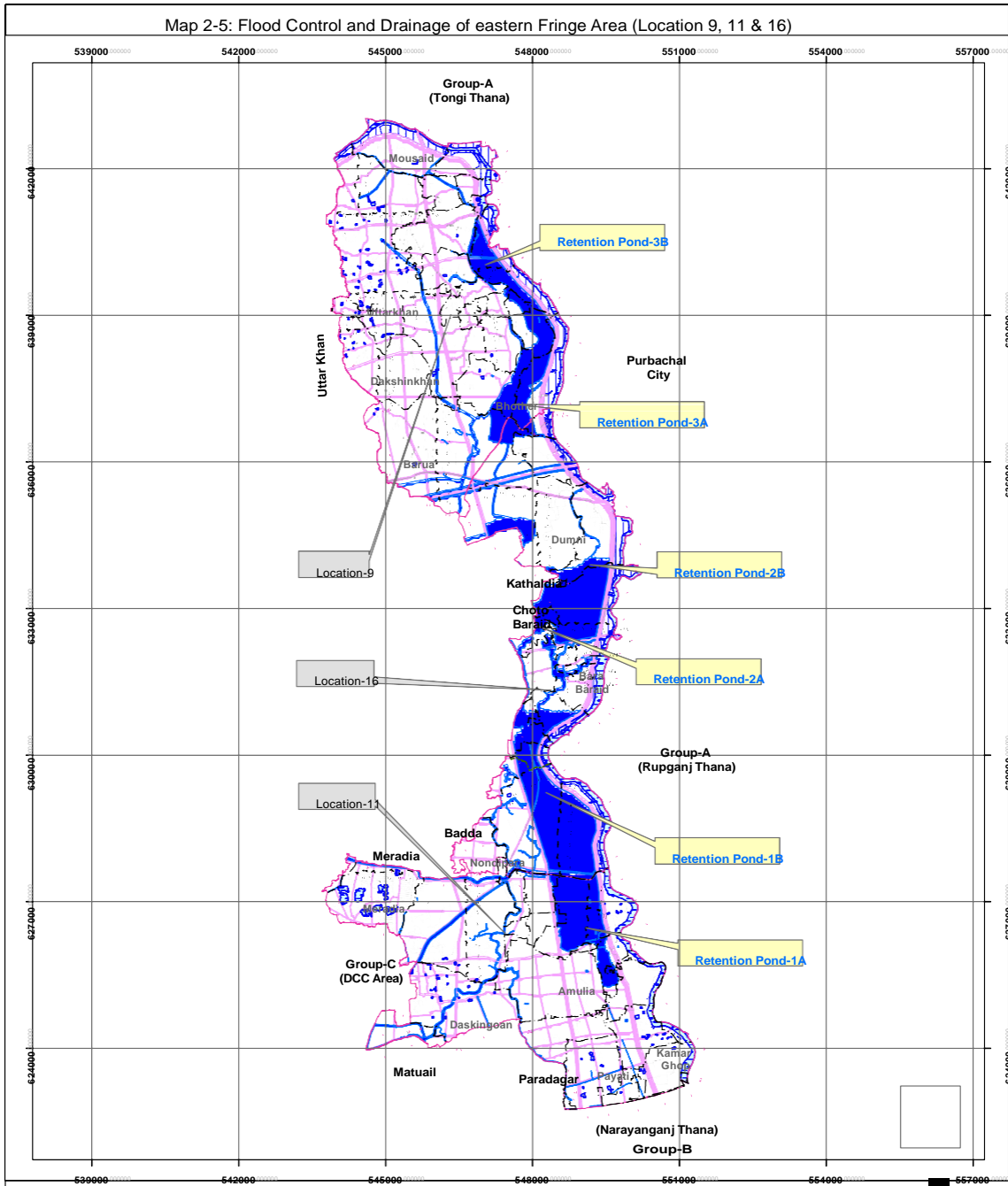


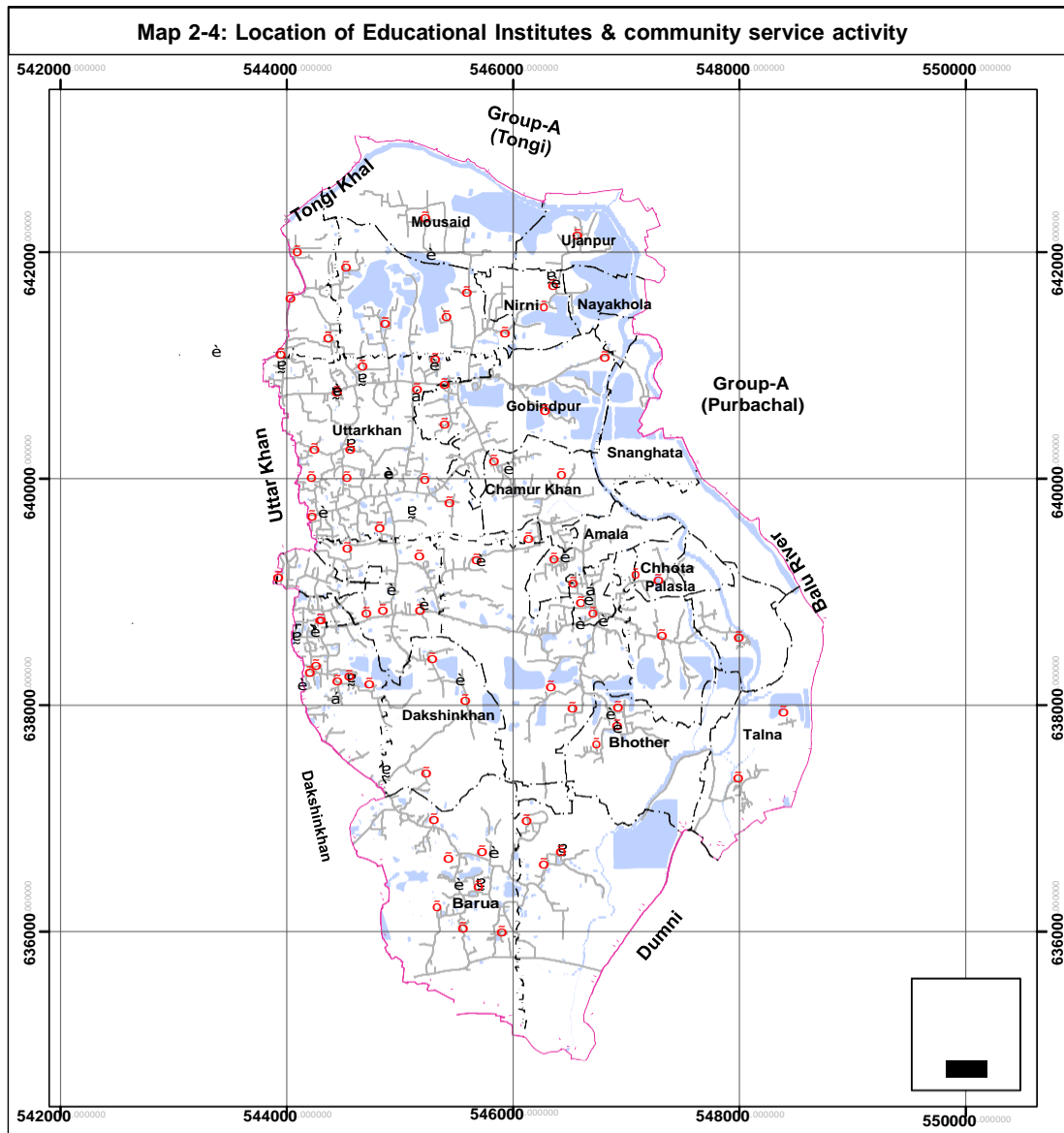
Map 2-5: Flood Control and Drainage of eastern Fringe Area (Location 9, 11 & 16)



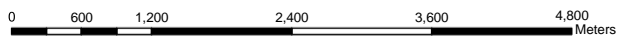
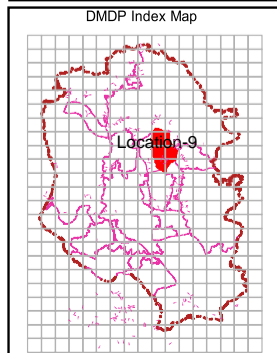
0 0.600 1.200 2.400 4.800 7.600 Meters

Legend		Proposed Landuse Categories	
Admin Boundary	Proposed Road Network	Water Retention Area	Transportation & Communication
DMDP boundary	Flood Flow Zone	Waterbody	
Group boundary			
Thana boundary			
Union boundary			
Mauza boundary			
Sheet boundary			

Source: Proposed by Consultants



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



**Legend**

- |                      |             |               |
|----------------------|-------------|---------------|
| — Group boundary     | All_Point_9 | 6 Crematorium |
| --- Thana boundary   | TYPE        | g Madrasa     |
| - - - Mauza boundary | Cemetery    | o Mosque      |
| - - - Sheet boundary | Church      | e School      |
| Existing Road        | College     | U University  |
| Existing waterbody   |             |               |

Source: Physical Features survey, 2005/2006

Several Number of retention pond has proposed in the area. These retention ponds will store the storm water of eastern Dhaka. According to the Halcrow study (Dhaka Integrated Flood Control Embankment cum eastern bypass road multipurpose project), the location-9 is situated in compartment 1. As they have divided the total eastern fringe area into three compartments. According to the study, the total catchment area of compartment 1 is 43.31 km<sup>2</sup>. In this compartment major portion of retention pond is situated in location-9. Incorporating all the survey data, secondary study and hydrological modeling of eastern Dhaka, following retention pond and waterbody have been proposed (Table 2-12).

**Table 2-12: Proposed retention pond and water body in location 9**

Use Type	Area (Acre)	Area(%)
Retention Pond	394.80	6.40
Water body	305.20	4.95
<b>Total</b>	<b>700.00</b>	<b>11.35</b>

Source: Proposed by Consultants

Some water bodies indicate that it can be used for recreational purpose by covering various types of project to inhibit the encroachment and for a sustainable environmental condition. The proposed water body and retention ponds are larger than recent mathematical modeling proposed area. Number of environmental uncertainties is related with the mass level of urbanization. These are:

- Global warming/increase of world temperature can enlarge the rainfall intensity
- Geologic fault in the eastern part, which do not allow high-level urbanization like western part of Dhaka
- Water bodies of eastern area are the main source of aquifer recharge of Dhaka

#### a. Drainage

Drainage is very important aspect for keeping the urban environment free from pollution and health hazards. Healthy atmosphere is pre-requisite for healthy living and healthy life. Drainage in the built up areas can be provided by network of drains. There should be sufficient tertiary, secondary and primary drains in the areas that can carry storm water generated by rain. As rainfall in the project area is comparatively high, the drain density needs to be also high.

#### Rainfall Analysis

Rainfall creates various types of adverse impact when the land formation is changed. In analyzing the rainfall, the design events have been formulated two issues according to the Halcrow study (Dhaka integrated flood control embankment cum eastern bypass road multipurpose project).

- The amount of rainfall provided by the frequency analyses during December-May period and the incidence of this rainfall quantity in the historical data set.
- The rainfall distribution in 5-days consecutive, 10-days consecutive have been presented respectively.

Table 2-13 shows the frequency analyses of Rainfall for Dhaka.

**Table 2-13: Results of frequency analyses for Dhaka rainfall during December-May Period (1-in 5 year return period) Using log normal distribution method**

Duration	Rainfall (mm)
5 days maximum	218
10 days maximum	299
Cumulative Monthly maximum	457

#### Internal Drainage

Internal drainage water is discharged by gravity during the dry season but is to be pumped up during the monsoon season. The analysis assumes that:

- 80 percent of project area will eventually be urbanized
- The design standard of internal protection is a 5 year storm event
- The drainage will have to handle wastewater effluents flows considering the future projected population over the next 25 years.

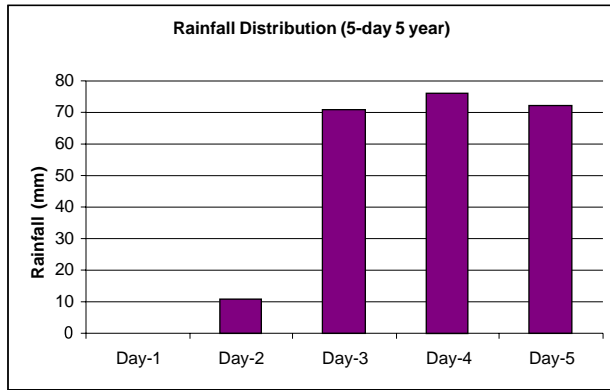


Figure 2-4: The rainfall distribution in 5-days consecutive

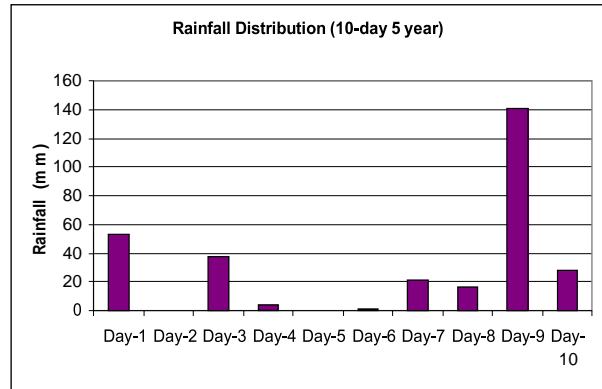


Figure 2-5: The rainfall distribution in 10-days consecutive

### Strom Water Drainage

Strom water drainage is one of the major concerns for urban area. In rainy season, the water level of the outer part of the embankment (eastern) will be higher than the inner area. So, gravity drainage is not possible in the time. Halcrow study has suggested the capacity of pump for various compartment of eastern Dhaka for monsoon water drain out. Among the compartments, location 9 is situated in the compartment North-P1 (Compartment 1). The entire pumps have to operate from the location 9 for the compartment North-P1. Halcrow study has examined two separate options for determining the pump capacity.

**Option 1:** The operation time of pump is allowed to continue maximum up to 4 days for evacuating the rainwater from single design storm event given that water level in the retention pond does not exceed 4.00 m PWD (Table 2-14).

**Option 2:** The operation time of pump does not exceed 2 days for evacuating the rainwater from a single design storm event given that water level in the retention pond does not exceed 4.00 m PWD (Table 2-15).

**Table 2-14: Pump operation time is allowed for maximum 4 days in location 9 (Option 1)**

Name of Compartment	Name of Pump Station	Pump Capacity (m <sup>3</sup> /s)	Max. water level in the Retention Pond (mPWD)	Operation time of pump for a single design rainfall event (hour)
North-P1	Pump-1	40	3.54	93

Source: Physical Features Survey, 2005/2006

**Table 2.15: Pump operation time is allowed for maximum 2 days in location 9 (Option 2)**

Name of Compartment	Name of Pump Station	Pump Capacity (m <sup>3</sup> /s)	Max. water level in the Retention Pond (mPWD)	Operation time of pump for a single design rainfall event (hour)
North-P1	Pump-1	70	2.85	36

Source: Physical Features Survey, 2005/2006

#### 2.1.1 Geological Fault

Geographically Bangladesh finds her in one of the most earthquake prone areas of the world. The Dhaka Metropolitan area is intersected by many geological faults. As per Earthquake Risk Index (ERI) Dhaka is one of the high-risk cities in the world. "Although geologically Dhaka is in the second earthquake prone zone, its vulnerability is due to its non-engineered structures", said experts. The Structure Plan identified three fault lines.

**Baunia Fault** is a small feature in the Baunia depression, west of Dhaka Zia International Airport; this lineament is characterized by sigmoidal fractures. **Bansi Fault** is one of the major structural features in the area. It has developed in the western part of the Madhupur Tract, along which zone the Bansi River flows. The fault is approximately 70 miles long. The western block is the down thrown block and the eastern block is the up thrown block. The Bansi Fault is also characterized by sharp fault scarps, hanging valleys, abnormal ground level and springs. **Turag Fault** is approximately 10 miles long. The feature is characterized by abnormal ground level. The northern block of the Turag Lineament moved west and the southern block east. The Turag River (Tongi Khal) flows along the northern boundary of the FAP-8A and FAP-8B project area embankments.

As these may pose restrictions to urban development (especially high rise construction), the alignment of the zone of influence has to be ascertained, while special building conditions may have to be included in the explanatory report that goes with the Detailed Area Plan. Development control should be exercised in these areas through Building Construction Rules, 1996 and Bangladesh National Building Code (BNBC), 1993 to avoid any possible disaster due to earthquake. From geological setting and topography, it is clear that Dhaka City and its surrounding area have experienced major and minor faulting at different times. Some faults and lineaments were observed in satellite images and aerial photographs and were confirmed through field surveys but, in many places, human settlement activities have destroyed the field evidences.

During field investigations, a sharp litho logical change observed in Dhaka City and its surroundings. There are many evidences of down-thrown blocks of the fault. Except for rapid subsidence, there is also evidence that there is a sharp lateral contract between layers. Considering various facts, it may be inferred that there is a displacement due to faulting. The north-south trend is considered the probable alignment of this fault. However, the project area falls in the earthquake Zone-2 of the seismic map of Bangladesh besides main sediments of the many parts of the project area are poorly compacted, highly plastic, collapsible thick peat and organic clay layers. With the presence of organic layers and sediments with low compaction, the area is considered a weaker foundation layer.

Any civil construction needs attention and special foundation treatment as well as significant design is recommended. Provisions of BC Rules 1996 and BNBC 1993 have to be strictly followed (**Map 2-6** shows the alignment of the fault lines.).

### **2.1.2 Spontaneous Development**

Development control function is very poor in the project area. With present capacity, RAJUK cannot oversee or pro-act to guide and steer development in desired areas of urban expansion. This resulted in:

- Unnecessary invasion of agricultural land by urbanization
- Non-conforming uses are found every where
- Residential areas are being invaded by industries

### **2.1.3 Infrastructure and Services**

Main objective of the Structure Plan was to establish a long-term primary road network, which will effectively serve the needs of the growing urban concentration, by providing improved access to the main urban area and linkages to areas with potential for growth. Improved road communication will be a positive instrument for promoting urbanization in Location-9 area. This is an important consideration when evaluating the feasibility of the network, particularly its sequence of development.

The DMDP suggested some substantial land fill-up for development in Location-9 areas without disturbing the natural drainage systems. Such pattern of development will also be encouraged in Location-11, Location-16 and Group-D areas due to strong demand for buildable land.

### **2.1.4 Environmental Concern**

The objective of the environmental impact assessment is to identify the environmental issues and parameters that may be affected by the implementation of the proposed project components, as well as an assessment of the current status of these issues and parameters. It also includes ensuring appropriate environmental concerns and to avoid or mitigate significant adverse effect on the environment. The positive and negative impacts on physical, biological, social and economic environments and their potential mitigation measures are described below:

#### **Flooding/ Drainage Congestion**

Flooding in the Location-9 area is a major concern and a matter of serious discussion among the dwellers. In the project area, Sangatha, Bother, Chottha Palasia, It causes intolerable sufferings for the people by creating difficult situation for movement as well as unhygienic environment that has long lasting consequences. Following are the main reasons for flooding in the area:

- Increase in covered areas causing higher rainfall run-off volume
- Unplanned and uncoordinated development
- Continuous filling of low lands for expansion of Dhaka City both by the public sector and private organizations
- Unauthorized and illegal occupation and destruction of natural drainage system and retention basins
- Inadequate storm water drainage facilities
- Disposal of solid waste, waste water and septic waste into the natural drainage system
- Clogging of natural drainage channels due to indiscriminate dumping of solid wastes and
- High water level in the peripheral river system

**Pollution****Groundwater Pollution**

Due to the existence of Garments Industry (dyeing section) adjacent to Tongi khal cause Groundwater pollution. Therefore, Manganese, Iron and hardness is a major problem in the project area. With expansion of urban area, more dependency on groundwater sources may increase the pollution level of sub-surface water.

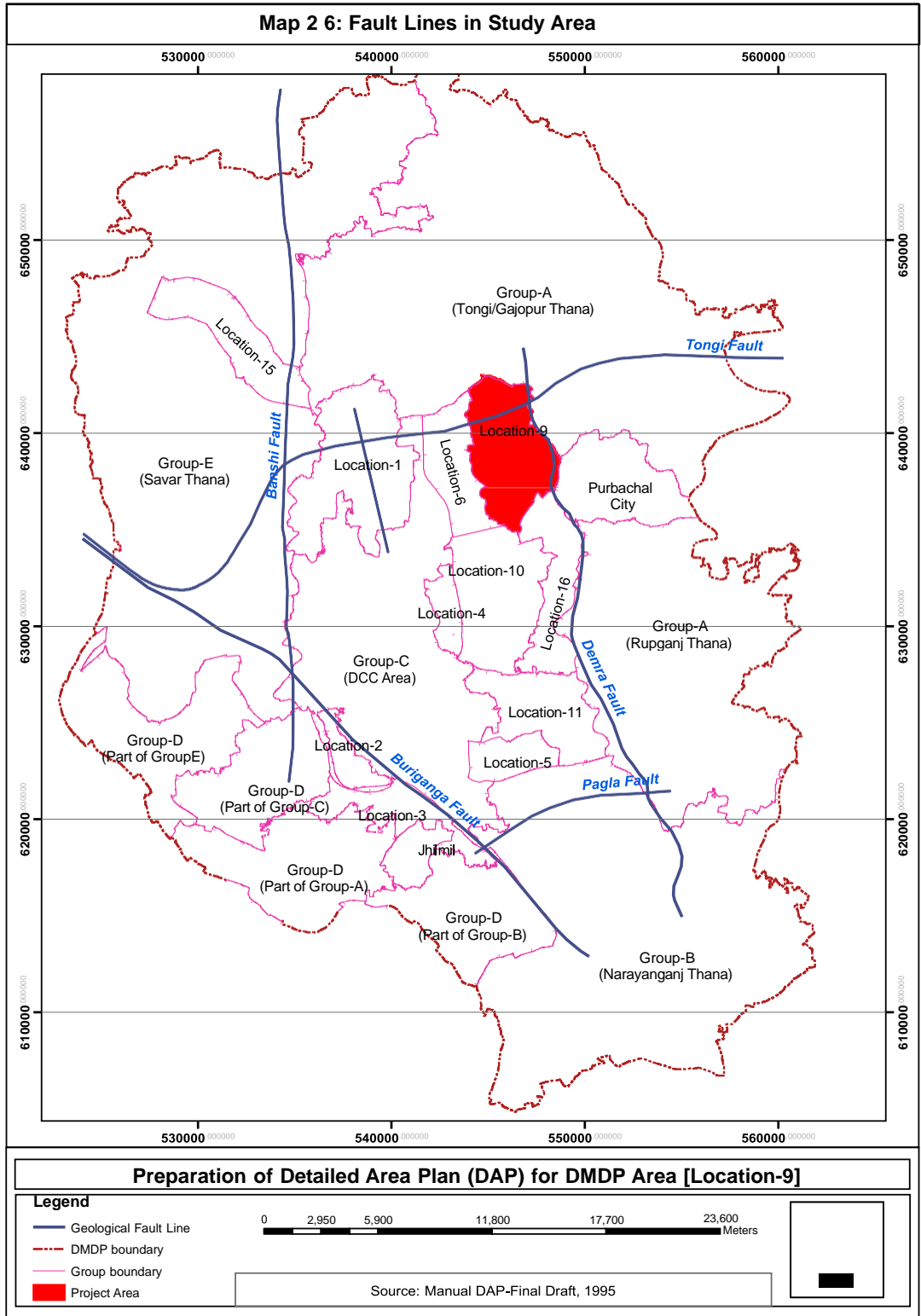
**Surface Water Pollution**

The surface water of Turag and Balu River, ponds and beels of the project area is polluted in respect of pH, turbidity, BOD and coliform bacteria with national standard. The main causes of surface water pollutions are wastewater, unsanitary sewage, solid waste dumping and discharge of untreated industrial wastes. With implementation of the DAP, the surface water pollution level may further increase for high volume of discharge of wastewater, sanitary sewerage, over spilling of pit and septic tank, industrial effluents, surface run-off of kutcha bazars, indiscriminate solid and medical waste dumping.

**2.1.1 Shelter and Settlement**

Settlement pattern of Location-9 is mainly of clustered and surrounds the existing road. The problem of Shelter is still acute as a major section of population is living below the standard and it has been projected by Center for Urban Studies (CUS, 2006) by 2015, 40% of Dhaka's population will live in Slums. However, this figure is based on aspect of natural growth rate and migration as well. This figure threatens that one of the major function of DAP will be to readjust the consolidated population to other surrounding areas beyond the central part.

It is well understood that in the socio-economic context of the country, the major shelter problem lies with the low-income population. The population density and the quality of life in the slums are alarming. Government agencies, including RAJUK need to be more aware for this section of population. However, it is already suggested in DMDP that role of RAJUK will be that of a facilitator and needs to remove the impediments in the supply, transfer and regulations of land for shelter. The government agencies should take care to ensure basic public health and minimum impact of natural hazards on shelter through flood control, drainage instruments and other measures. (DMDP, Vol-I, p30). These housing can be provided by government, formal and informal private sector among which, the first two needs to be ensured. Through DAP, RAJUK can take the role to promote, demonstrate and facilitate the provision of shelter mainly through indirect measures.



### 2.3 Current Public Sector Investment Program

Table 2-16 shows the current investment project in the project area.

**Table 2-16: List of Current Investment Project and Implementing Agency**

<b>Serial No.</b>	<b>Project Name</b>	<b>Implementing Agency</b>
1.	Tongi Bridge	LGED
2.	Khilkhet to Purbachal Road	RAJUK

## Chapter- 3

### DEVELOPMENT PLAN PROPOSALS

---

#### 3.1 Abiding Policy Frameworks of Higher Level Plans

Development of a controlled growth in Dhaka relies upon the adherence to a pre-determined plan. The Dhaka Metropolitan Development Plan (1995-2015) was prepared addressing urban planning issues at three geographic levels: sub-regional, urban and the sub-urban. There were two relevant plans upon which the basis of Detailed Area Plan relied; these are Dhaka Structure Plan and Urban Area Plan (1995-2015).

##### 3.1.1 Dhaka Structure Plan (1995-2015)

This plan was prepared to provide a long-term (20 years) strategy for development of greater Dhaka. It projected a population of 15 million by 2015. The plan defines a broad set of policies to achieve the overall plan objectives. Its supporting documentation proposed actions for the presentation of high quality wetland, agricultural land and water-courses. It highlighted the need for retention ponds around the city limits for rainwater retention and maintenance of ecological balance. The structure plan called for plan reviews every five years.

##### 3.1.2 Dhaka Urban Area Plan (1995-2009)

The Urban Area Plans were developed for the DCC and its major expansion areas, including the areas to the east (e.g. Location-9) of the DCC. The Urban Area Plans were intended to provide mid term strategies and were conceived as “nested” written the overall structure plan. This plan provided an interim mid-term strategy for the 10 years to 2005 and covers the development of urban areas within the metro Dhaka management area. The main theme of structure plan and the urban area plan is to help in providing detailed planning proposals for specific sub areas of Dhaka.

Both the Structure Plan and Urban Area Plan viewed population growth be treated as a target rather than a prediction. The strategy of both of these plans must be pragmatic and in line with projected population. The plans aimed at lower densification of accelerated development of land recently developed, providing basic utility services, road networks, curtailment of development at peripheral low lands, planned development at flood protected areas, and strategic new plan proposals for existing city including planned growth in the east (e.g. Location-9).

#### 3.2 Design Principle and Standards

##### 3.2.1 Guiding Principles

Physical Planning in developing countries are regarded as essentially static, lacking effective landuse control mechanism and investment priorities. Planning is restricted by the lack of physical means to ensure implementation, anticipate market reactions, as well as means to consider the cost implications for various income groups.

The most commonly used planning tools include comprehensive general tools like master plan, strategic plan, structure plans. The broad objectives of these planning are to guide the development for a specified time-period and to promote the landuse pattern, which most efficiently fulfills the objectives of the government. However, to attain the future shape there were certain effective landuse control mechanisms which are reviewed. These experiences show quite dynamic planning design principles and tools for developing countries.

The design principles that has been visualized as a set of planning tools, for guiding and controlling the land use management includes investment principles. The planning tool's broad objectives are to guide the future development of the Location-9 area for a specified period (2015 and beyond) and promote an ideal density landuse pattern which most efficiently fulfill the objective of the detail area plan as sponsored by RAJUK. The set of design principles adopted for landuse proposals are as follows:

The set of design principles adopted for landuse proposals are as follows:

- a) Land Readjustment
- b) Guided Land Development
- c) Land Expropriation and Land Banking
- d) Site and Service
- e) Land Use Zoning

Details have been explained in Chapter-4.

### 3.2.2 Planning Standards

Standards for community facilities also need to be fixed to ensure better condition of urban living. Considering the relevant available standards, DAP consultants propose the planning standards for different community services. In the calculation process existing Building Construction Rules, 2008 and average standard of facilities are considered (Table 3-1).

**Table 3-1: Recommended Planning Standards for Different Community Services**

Sl. No.	Name of the Facility	Quantity		Area		
		Min. (No.)	Max. (No.)	Minimum for Unit Facility	Sub Class Total	Class Total (Acre)
1	Primary School(Public or private)	2	3	1 Acre		3
2	High School(Public or private)	1	2	1.5 Acre		3
3	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	
4	Mosque and Maktab/ Worship Places	2	3	0.2 Acre		0.6
5	Library(central)	1	1	0.1 Acre		0.2
6	Services			0.3 Acre		0.5
	i)Dentist/Doctor's Chamber	2	3	40 sq.m	120 sq.m	
	ii) Beauty Parlour	1	2	50 sq.m	100 sq.m	
	iii) Laundry	2	3	16 sq.m	50 sq.m	
	iv) Hair Dresser	2	3	12 sq.m	40 sq.m	
	v) Cyber Café/Internet service provider	1	2	50 sq.m	100 sq.m	
	vi) Photocopy / mobile / land phone / fax	2	2	12 sq.m	40 sq.m	
	vii) Computer based (word processing, printing etc) services	1	1	30 sq.m	30 sq.m	
	viii) Motor bike Repair, vulcanising etc.(optional)	1	1	50 sq.m	50 sq.m	
	ix) NMT repair service (Rickshaw, bicycle etc)	1	2	30 sq.m	60 sq.m	
	x) Post Office / Courier Services	1	2	20 sq.m	40 sq.m	
	xi) Sports / Recreational facilities(games, indoor games etc)	1	2	50 sq.m	100 sq.m	
	xii) Rickshaw/Auto stand (General)	2	4	100 sq.m	400 sq.m	
	xiii) Restaurant, Tea bar, Fast food	2	4	10 sq.m	100 sq.m	
	xiv) Tailoring	1	2	20 sq.m	40 sq.m	
7	Solid waste transfer station(may also small scale processing)	1	1	0.5 Acre		1
8	Utility Facilities					1*
9	Neighborhood Co-operative Office Complex			0.33 Acre		0.5

	i) Offices	2	4	15 sq.m	60 sq.m	
	ii) Committee rooms	2	3	40 sq.m	120 sq.m	
	iv) Community Club including indoor games (male and female)	2	2	200 sq.m	400 sq.m	
	v) Cultural Facilities (Rehearsal, Music room etc)	1	2	30 sq.m	60 sq.m	
	vi) Community Police Barrack	1	1	40 sq.m	50 sq.m	
	vii) Technician Service (Electrical, Plumber, AC, Freeze etc.)	2	4	25 sq.m	100 sq.m	
10	Community Hall	1	2	0.33 Acre		0.5
11	Shops			0.33 Acre		0.5
	i) General store	3	4	25 sq.m	100 sq.m	
	ii) Grocery	4	6	25 sq.m	150 sq.m	
	iii) Stationary	2	3	25 sq.m	150 sq.m	
	iv) Confectionary / Bakery	2	3	25 sq.m	80 sq.m	
	v) Departmental Store**	1	2	100 sq.m	200 sq.m	
	vi) Medicine Shop	2	3	25 sq.m	80 sq.m	
	vii) Sweet Meat Shop	2	3	25 sq.m	80 sq.m	
	viii) Book / Newspaper Stall	2	3	10 sq.m	30 sq.m	
	ix) Fresh Corner (Vegetable, fish, meat, egg, chicken etc.)	2	3	12 sq.m	40 sq.m	
	x) Fruit Shop	2	3	10 sq.m	30 sq.m	
	xi) Flower Stall	2	2	10 sq.m	30 sq.m	
	xii) Gift shop	1	2	10 sq.m	30 sq.m	
<b>Total Area for the Neighborhood Facilities</b>				<b>22.8 Acres (approx.)</b>		

Source: Proposed by the Consultants

\* May be added as per decision of the Nagar Unnayan Committee under New use category

\*\*Area under Departmental Store shall be calculated on the basis of the spaces allocated against one of the corresponding services in this table (cumulative area)

Urban residential zone shall be developed in terms of neighborhood concept following approximate standards and the area will be free of thorough traffic.

Gross area of neighbourhood : 50 acres [approx.]. It may vary depending on the population density of the Planning Area

Gross density : 225 to 250 persons per acre.

Table 3-2 represents the Road Standards used in previous higher-level plans. Considering the previous standards Road standards for Location 9 has been given in Table 3-3.

**Table 3-2: Planning Standards for Roads (Recent Metropolitan Plans)**

Sl. No.	Categories of Road	Standards in Recent Metropolitan Plans (ROW)		
		RMDP	KMDP	DMDP
1	Main Road/ Primary Road	New 100ft.-120ft. Widening 60ft.-80ft.	100ft.-120ft.	24.0 m. (78.0 ft.)
2	Arterial Road/ Secondary Road	New 60 ft. Widening 40ft.	60 ft - 80 ft.	14.5 m. (47.5 ft.)
3	Collector Road	New 30 ft.-40 ft. Widening 30ft.	40ft.- 50 ft.	13.00 m. (42.6 ft.)
4	Tertiary Road / Access Road	New 30 ft. Widening 20ft.	--	9.0m.-6.0 m. (29.5ft.-19.7ft.)
5	Non-Motorized Road	--	--	4.0 m. (13.1 ft.)
6	Footpath	--	--	2.5 m. (8.2 ft.)

Source: RMDP (2004-2024), DMDP (1995-2015), KMDP (2001-2020)

Table 3-3: Proposed Road Standard for DAP Area

SL No.	Road Category	Type	Built-up Area	Less Built-up Area
			ROW (Ft)/M	ROW (Ft)/M
1	Primary Road	Type-1	80 (24.39)	170 (51.83)
2	Primary Road	Type-2	80 (24.39)	130 (39.63)
3	Primary Road	Type-3	80 (24.39)	100 (30.49)
4	Secondary Road	Type-1	60 (18.29)	80 (24.39)
5	Secondary Road	Type-2	40 (12.0)	60 (18.29)
6	Tertiary Road	Type-1	40 (12.0)	40 (12.0)
7	Tertiary Road	Type-2	30 (9.19)	40 (12.0)
8	Access Road	Type-1	24 (7.32)	30 (9.19)
9	Access Road	Type-2	20 (6.10)	24 (7.32)

Source: Proposed by the Consultants

### 3.3 General Development Strategies

The area under Location-9 is broadly bounded from the north by the Tongi Khal, from the east by the Balu River, from the south by the proposed Purbachal Road and from the west by the Uttar Khan and Dakshin Khan Mouzas. The total area of Location-9 is approximately 6167.91 acres covering 18 Mouzas (part and full) and part of SPZ 13.2 (Map 3-1). According to 2001 Census, Location-9 has a total population of 61511 and the density is 10 person per acre. The reason for such low-density is being the area's agricultural nature and pre-dominant semi-urban/ underdeveloped growth without DCC control and basic urban services. Table 3-4 shows mouza wise population of the Project area.

Table 3-4: Mouza wise Area, Household, Population and Density

Mouza Name	Name of Union	Area (Acres)	H/H 2001	Population				Density			
				2001	2007	2011	2015	2001	2007	2011	2015
Amala	Uttar Khan East	115.52	204	1117	1254	1329	1464	10	11	12	13
Anul	Dakshin Khan	53.26	481	1620	1819	1928	2123	30	34	36	40
Barua	Dakshin Khan	1068.94	1565	7687	8631	9146	10073	7	8	9	9
Bhaturia	Uttar Khan East	239.29	161	856	961	1018	1122	4	4	4	5
Bhothar	Uttar Khan West	424.34	308	1668	1873	1985	2186	4	4	5	5
Chamurkhan	Uttar Khan East	190.61	420	2155	2420	2564	2824	11	13	13	15
Chhota palashia	Uttar Khan East	43.50	21	144	162	171	189	3	4	4	4
Dakshin khan	Dakshin Khan	568.01	4630	18908	21231	22497	24778	33	37	40	44
Gobindapur	Uttar Khan East	333.75	520	2593	2912	3085	3398	8	9	9	10
Kashkara	Uttar Khan East	43.20	340	1680	1886	1999	2202	39	44	46	51
Mausaid	Uttar Khan East	349.44	394	1917	2153	2281	2512	5	6	7	7
Nayakhola	Uttar Khan East	75.39	58	236	265	281	309	3	4	4	4
Nirni Chal	Uttar Khan East	22.98	72	312	350	371	409	14	15	16	18
Nirni	Uttar Khan East	108.83	18	69	77	82	90	1	1	1	1
Plashia	Uttar Khan East	52.29	76	216	243	257	283	4	5	5	5
Snanghata	Uttar Khan East	327.93	76	299	336	356	392	1	1	1	1
Ujanpur	Uttar Khan East	178.68	247	1017	1142	1210	1333	6	6	7	7
Uttar khan	Uttar Khan West	1971.96	4097	19017	21353	22627	24921	10	11	11	13
<b>Total</b>		<b>6167.91</b>	<b>13688</b>	<b>61511</b>	<b>69068</b>	<b>73188</b>	<b>80607</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>

Source: BBS, 2001, and projection based on it

Table 3-5 and 3-6 show the Existing and Proposed Land use of the Project Area and Map 3-1 & 3-2 represents the Existing & Proposed Land use of Project Area respectively.

Table 3-5: Details of Existing Landuse

Serial No.	Landuse Type	Area (Acre)	Percentage
1	Residential	2022.21	32.79
2	Commercial	31.18	0.51
3	Institutional	6.97	0.11
4	Mixed Use	22.19	0.36
5	Open Area	599.91	9.73
6	Community services	0.48	0.01
7	Industrial	6.53	0.11
8	Graveyard	0.00	0.00
9	Road Network	80.91	1.31

10	Agriculture	3140.57	50.92
11	Sand Fill	38.20	0.62
12	Service Activities	0.17	0.00
13	Water Body	218.59	3.54
14	Restricted Area	0.00	0.00
	<b>Total</b>	<b>6167.91</b>	<b>100.00</b>

Source: Landuse Survey, 2005-2006

**Table 3-6: Details of Proposed Landuse**

Serial No.	Land Use type	Area (Acre)	Percentage	Remarks
1	Flood Flow Zone	312.84	5.07	
2	Institutional Zone	5.66	0.09	
3	Mixed Use Zone (Residential-Commercial)	532.04	8.63	
4	Open Space	4.94	0.08	
5	Overlay Zone	42.19	0.68	Proposed Graveyard
6	Overlay Zone	69.61	1.13	Water Treatment Plant
7	Proposed Road Network	635.67	10.31	
8	Rural Settlement Zone	30.94	0.50	
9	Transportation & Communication	78.25	1.27	
10	Urban Residential Zone	3583.56	58.10	
11	Water Retention Area	690.38	11.19	
12	Waterbody	181.83	2.95	
	<b>Total</b>	<b>6167.91</b>	<b>100.00</b>	

Source: Proposed by Consultants

**Table 3-7: Status of Proposed Overlay Zone of Location-9**

Serial No.	Proposal Type	Locality	Area (Acres)
1	Graveyard	Uttarkhan	42.19
2	WASA Water Treatment Plant	Uttarkhan	13.26
3	WASA Water Treatment Plant	Tongji	7.85

Source: Proposed by Consultants

**Table 3-8: Details of Existing and Recommended Facilities: Social Infrastructure**

Serial No.	Type of Facilities	Existing		Additional Proposal	
		Number	Area (Acre)	Number	Area (Acre)
1	Primary School	25	1.27	8	8.00
2	High School	11	0.94	14	28.00
3	College	0	0	20	100.00
4	University	0	0	0	0
5	Madrasha	15	0.6	20	20.00
6	Park/Open Space	0	0	493	79.00
7	Hospital/Clinic	0	0	3	2.90
8	Graveyard	0	0	3	9.00
9	Community Center	0	0	3	0.90
10	Katcha Bazaar	3	0.27	3	3.00
11	Mosque	79	2.89	3	0.90
12	Temple/Church	3	0.05	0	0
13	Fire Station	0	0	3	3.00
	<b>Total</b>	<b>136</b>	<b>6.02</b>	<b>573</b>	<b>254.70</b>

Source: Physical Features survey 2005-2006

\* Out of 3 health centres, one will be general hospital with 2.00 acre

## Flood Protection Proposal

### Sluice Gates

Because of the construction of proposed flood protection embankment, outside floodwater from the Balu River and Tongji khal will not be able to enter the Dhaka East area, but the internal storm water will not be able to drain out. To drain out internally accumulated storm water, sluice gates are proposed at chainage 0.9 km (SG1), at 5.10 km (SG2), at km 10.50 (SG3), at 17.85 km (SG4), at 18.75 km (SG5), at 20.79 km (SG6) and at 23.30 km (SG7).

**Pump Stations**

Sluice gates can operate and drain out internal pooled storm water when the external river water remains at lower level. However, during the monsoon or rainy season when the river water remains at higher level and inside water level remains low, gates cannot drain out water. Under such condition storm water from inside is to drain out by pumps. Three pump stations at chainage 10.02 km (PS1), at chainage 17.15 km (PS2) and at chainage 20.10 km (PS3) are proposed to build on the new flood protection embankment. Thus, 3 pump stations and 7 sluice gates will be able to serve drainage purpose.

**Drainage Khal Re-excavation Plan**

Re-excavation of Baothar khal is required to be done from their off-takes to the meeting point and that will give a straight alignment to pump station-1 and sluice # SG3 Drainage Infrastructure (Major element/ principles of drainage system). In implementing various infrastructures for development, drainage is generally given less importance and is normally considered as the last or final steps for development. This scenario is particularly true for Bangladesh; although among different types of infrastructures, drainage has by far the heaviest impact on physical infrastructure network. As a result, physical environment, health, hygiene and standard of living is affected seriously. In development projects the Government, Semi-government and Public sector's funds allocated for the project are mostly spent on buildings, roads and other tangible infrastructures and drainage comes as the final item of development. But, in case of urban development if drainage is not given due priority, the sufferings of the inhabitants and stakeholders will continuously increase with passage of time.

Drainage development for urbanization should start with drains. Drains can be classified as Plot drains, Block drains, Tertiary drains, Secondary drains and Primary drains. Other kinds of drainage infrastructure are lowland, outfall areas, khals and rivers. Man, made drains are Plot, Block, Tertiary, Secondary and Primary drains and others are natural drainage infrastructures. In planning for drainage network, care should be given for road network in terms of conflict of drainage and waterways with roads.

**Reservoirs**

Large tanks and ponds, dighis, lakes etc. serve as immediate retention areas for storm water. These can be both man-made and natural; and these may be privately owned or government owned or khas land. These function as drainage relief and source for water for emergency use, fisheries, duckers, environment and nature preservation. For every mouza such reservoir is available. Physical feature survey maps and field survey maps (Tank, pond, and reservoir) show the existence of reservoirs and data base shows in details their dimensions. These structures should not be disturbed or removed by physical interventions by land fillings or other means rather should be properly maintained and preserved.

**Other Drainage Related Infrastructures**

In order to facilitate or mitigate drainage issues some infrastructures are provided or used, these are namely

- i. Bridges, Culverts, Box Culverts
- ii. Drainage Sluices, Pipe Sluices, Siphons
- iii. Flood Protection Embankments and Flood Walls
- iv. Sluice Gates, Regulators, Navigation Lock
- v. Flood Protection and Drainage Structures