

# **CHITTAGONG STORMWATER DRAINAGE AND FLOOD CONTROL MASTER PLAN**



**Chittagong Development Authority**  
The Government of the People's Republic of Bangladesh



**CHITTAGONG METROPOLITAN  
MASTER PLAN**

**CHITTAGONG STORMWATER DRAINAGE  
AND FLOOD CONTROL MASTER PLAN**

**MARCH 1994**

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Chittagong Development Authority

বাংলাদেশ



গেজেট

অতিরিক্ত সংখ্যা  
কর্তৃপক্ষ কর্তৃক প্রকাশিত

বুধবার, ডিসেম্বর ৯, ১৯৯৯

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

গৃহায়ন ও গণপূর্ত মন্ত্রণালয়

শাখা-৮

প্রজ্ঞাপন

তারিখ, ১৭ই ফাল্গুন, ১৪০৫/১লা মার্চ ১৯৯৯ ইং

এস. আর. ও নং ৩৮-আইন/৯৯-যেহেতু Chittagong Development Authority Ordinance, 1959 (E.P. Ord. No. L1 of 1959) অতঃপর উক্ত Ordinance বলিয়া উল্লিখিত, এর section 22-এর sub-section (3)-তে প্রদত্ত ক্ষমতাবলে সরকার চট্টগ্রাম উন্নয়ন কর্তৃপক্ষ, অতঃপর চট্টক বলিয়া উল্লিখিত, এর এবতিয়ারাধীন এলাকার বিদ্যমান Master Plan বাতিলক্রমে একটি নূতন Master Plan অত্র মন্ত্রণালয়ের প্রজ্ঞাপন নং-এস. আর. ও ২৮২-আইন/৯৮, তারিখ ৮-১২-৯৮ ইং, এর মাধ্যমে প্রকাশ করিয়া উহার বা উহার কোন অংশবিশেষের উপর কোন ক্ষতিগ্রস্ত বা অন্য কোন ব্যক্তির আপত্তি বা সুপারিশ উক্ত section-এর sub-section (4) এ নির্ধারিত সময়সীমার মধ্যে দাখিল করার জন্য আহ্বান করিয়াছে।

এবং যেহেতু উক্ত সময়সীমার মধ্যে প্রাপ্ত আপত্তি বা সুপারিশ বিবেচনা করিয়া সরকার উক্ত section-এর sub-section এ নির্ধারিত সময়সীমার মধ্যে কতিপয় সংশোধনসহ নূতন Master Plan টি অনুমোদন করিয়াছে;

অতএব, যেহেতু উক্ত Ordinance-এর section 23-এর sub-section (1) এর বিধান মোতাবেক সরকার অত্র প্রজ্ঞাপনের দ্বারা নূতন Master Plan-এর অনুমোদনের বিষয়টি অনুমোদিত Master Plan সহ সংশ্লিষ্ট সকলের অবগতির জন্য প্রকাশ করিল।

বিশেষ দৃষ্টব্য : প্রস্তাবিত Master Plan (মাস্টার প্ল্যান)-এর একাধিক কপি ক্যানিং উইং, চট্টগ্রাম উন্নয়ন কর্তৃপক্ষ, চট্টক ভবন-এর ৪র্থ তলায় জনসাধারণের পরিদর্শনের জন্য সংরক্ষিত আছে।

রষ্ট্রেপতির আদেশক্রমে-

দেবদত্ত খাঁসা

উপ-সচিব (মনিটরিং সেন)।

মোঃ আবদুল করিম সরকার (উপ-সচিব), উপ-নিয়ন্ত্রক, বাংলাদেশ সরকারী মুদ্রণালয়

ঢাকা কর্তৃক মুদ্রিত।

মোঃ আমিন জুবেরী আলম, উপ-নিয়ন্ত্রক, বাংলাদেশ ফরমস্ ও প্রকাশনী অফিস,

তেজগাঁও, ঢাকা কর্তৃক প্রকাশিত।

বাংলাদেশ



গেজেট

অতিরিক্ত সংখ্যা  
কর্তৃপক্ষ কর্তৃক প্রকাশিত

মঙ্গলবার, এপ্রিল ২০, ১৯৯৯

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

গৃহায়ন ও গণপূর্ত মন্ত্রণালয়

শাখা-৮

সংশোধনী

তারিখ, ২১ শে মার্চ ১৯৯৯

নং-শা-৮/চউক-৭/৯৭/২৩-গত ৩রা ফেব্রুয়ারী ১৯৯৯ তারিখে বাংলাদেশ গেজেটের অতিরিক্ত সংখ্যায় প্রকাশিত এস. আর. ও নং-৩৮/আইন/৯৯-এর গেজেট বিজ্ঞপ্তির ১ম পৃষ্ঠায় প্রকাশনার তারিখ ভুলবশতঃ “বুধবার, মার্চ ৩, ১৯৯৯”-এর স্থলে “বুধবার, ফেব্রুয়ারী ৩, ১৯৯৯” ছাপা হইয়াছে।

এক্ষণে, উক্ত গেজেট বিজ্ঞপ্তিটির ১ম পৃষ্ঠায় “বুধবার ফেব্রুয়ারী ৩, ১৯৯৯”-এর স্থলে “বুধবার, মার্চ ৩, ১৯৯৯” পড়িতে হইবে।

দেবদত্ত খাঁসা

উপ-সচিব (মনিটরিং সেল)।

মোঃ আবদুল করিম সরকার (উপ-সচিব), উপ-নিয়ন্ত্রক, বাংলাদেশ সরকারী মুদ্রণালয়  
ঢাকা কর্তৃক মুদ্রিত।

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তেজগাঁও, ঢাকা কর্তৃক প্রকাশিত

(১৮৮৩)



বাংলাদেশ



গেজেট

অতিরিক্ত সংখ্যা  
কর্তৃপক্ষ কর্তৃক প্রকাশিত

বুধবার, ডিসেম্বর ৯, ১৯৯৮

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

গৃহায়ন ও গণপূর্ত মন্ত্রণালয়

শাখা-৮

প্রজ্ঞাপন

তারিখ, ২৪শে অগ্রহায়ণ ১৪০৫ বাং/৮ই ডিসেম্বর ১৯৯৮ ইং

এস. আর. ও নং-২৮২-আইন/৯৮-যেহেতু চট্টগ্রাম উন্নয়ন কর্তৃপক্ষ, অতঃপর চটক বলিয়া উল্লিখিত, এর এখতিয়ারাধীন এলাকার জন্য Master Plan (মাস্টার প্ল্যান) প্রস্তুত করা প্রয়োজন ও সমীচীন এবং যেহেতু Chittagong Development Authority Ordinance, 1959 (E.P. Ord. No. LI of 1969)-এর section 22-এর sub-section (2)-এর শর্তাবলী পূরণ করিয়া 'চটক' উক্ত এলাকার Master Plan (মাস্টার প্ল্যান) প্রস্তুত করিয়া সরকারের নিকট ১৮ই অগ্রহায়ণ ১৪০৫, মোতাবেক ২রা ডিসেম্বর, ১৯৯৮ ইং তারিখে দাখিল করিয়াছে।

অতএব, যেহেতু সরকার উক্ত section এর sub-section (3)-তে প্রদত্ত ক্ষমতাবলে একটি নূতন প্রস্তাবিত Master Plan (মাস্টার প্ল্যান) এতদ্বারা প্রকাশ করিল, যাহা বিদ্যমান Master Plan বাস্তবিক্রমে কার্যকর হইবে।

প্রস্তাবিত Master Plan (মাস্টার প্ল্যান) বা উহার কোন অংশবিশেষ-এর উপর কোন ক্ষতিগ্রস্ত অথবা অন্য কোন ব্যক্তির আপত্তি থাকিলে তাহাকে অত্র প্রজ্ঞাপন জারীর ৩০ (ত্রিশ) দিনের মধ্যে প্রধান প্রকৌশলী, চট্টগ্রাম উন্নয়ন কর্তৃপক্ষ, চটক ভবন, কোর্ট রোড, চট্টগ্রাম-৪০০০ বরাবরে তাহার আপত্তি বা সুপারিশ দাখিল করার জন্য অনুরোধ করা যাইতেছে।

বিশেষ দৃষ্টব্য : প্রস্তাবিত Master Plan (মাস্টার প্ল্যান)-এর একাধিক কপি ক্যানিং উইং, চট্টগ্রাম উন্নয়ন কর্তৃপক্ষ, চটক ভবন-এর ৪র্থ তলায় জনসাধারণের পরিদর্শনের জন্য সংরক্ষিত আছে।

রাষ্ট্রপতির আদেশক্রমে-

দেবদত্ত বীসা

উপ-সচিব (মনিটরিং সেল)।

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ঢাকা কর্তৃক মুদ্রিত।

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তেজগাঁও, ঢাকা কর্তৃক প্রকাশিত

(৯৭৯৬)

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## ABBREVIATIONS USED IN THE REPORT

BEPZA	Bangladesh Export Processing Zone Authority
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BOD	Bio Oxygen Demand
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CCC	Chittagong City Corporation
CDA	Chittagong Development Authority
CDS	Chaktai Diversion South-West
CPA	Chittagong Port Authority
CWASA	Chittagong Water Supply and Sewerage Authority
DHI	Danish Hydraulic Institute
ECI	Engineering Consultants International
EIP	Environmental Improvement Project
EIRR	Economic Internal Rate of Return
EPWAPDA	East Pakistan Water and Power Development Authority
FAP	Flood Action Plan
GoB	Government of Bangladesh
IECO	International Engineering Company
ISLWL	Indian Springs Low Water Level
MCC	Mirza- Chaktai Connector
MCM	Million Cubic Metres
MNC	Mirza-Noa Connector
MRB	Mirza By-pass
MSL	Mean Sea Level
NPV	Net Present Value
PWD	Public Works Datum
SCS	U.S. Soil Construction Service
SMA	Statistical Metropolitan Area
Tk.	Taka (Bangladesh Currency)
TOR	Terms of Reference
UNCHS	United Nations Centre for Human Settlements



# 1. INTRODUCTION

## OBJECTIVES

- 1.1 The objectives of the Stormwater Drainage and Flood Control Component laid down by UNCHS were :
- (a) preparation of a comprehensive stormwater drainage and flood control Master Plan for the metropolitan area within the Chittagong Development Authority (CDA) administrative boundary including the land area on the left bank of the Karnaphuli River;
  - (b) identification of a first phase project package to a technical standard and a degree of a detail suitable for appraisal and subsequent funding by an International Funding Agency; and
  - (c) formulation of recommendations aimed at strengthening the present technical, managerial and administrative capabilities with respect to responsibility for design, implementation and operation and maintenance of stormwater drainage and flood control facilities.

## STUDY AREA

- 1.2 The area studied is shown in Figure 1.1 and is in principle the urban area within the CDA boundary, together with those areas within the boundary which are considered likely to become urban during the Master Plan design period, that is between now and the year 2015.
- 1.3 The Terms of Reference (TOR) accepted that northern parts of the CDA area could be omitted if it emerged that the drainage of Hathazari and the villages in the north had no impact of the drainage of urban Chittagong. Initial studies showed that, north of an East-West line running approximately between Kalurghat and Foulzderhat, all drainage channels run either eastwards to the Karnaphuli and Halda Rivers or westwards to the Bay of Bengal, and therefore do not affect the city. The northern limit of the study area was therefore set as a line running approximately East to West just north of the BRTC depot and Nutanpara Railway Station but taking into account drainage area boundaries, including that of the Khandakia Khal, which at times is subject to flooding. The Cantonment Area was not studied except insofar as flows arising from within the Cantonment were taken into account.
- 1.4 On the Left Bank the CDA boundaries enclose a very large, as yet undeveloped, area. The drainage problems of that area will, when it is developed, be similar throughout the district. In order to define a study area of reasonable size a North-South line has been drawn through the hills that run down to the Karnaphuli. This area includes the Murari Khal, the biggest channel on the Left Bank and one which is tidal.



- 1.5 North of the Kalurghat Bridge the eastern boundary of the study area is marked by the Halda and Karnaphuli Rivers.

#### AVAILABILITY OF MAPS

- 1.6 The mapping which we were able to obtain was as follows :
- (a) 1:3960-scale maps of the Chittagong area, prepared in 1952-54;
  - (b) 1:20,000-scale Guide Map of most of the city;
  - (c) 1:50,000-scale maps of the Chittagong area;
  - (d) 1:250,000-scale maps of the Chittagong area;
  - (e) 1958-61 aerial photographs of the city; and
  - (f) 1984 aerial photographs of the Chittagong area.
- 1.7 We failed to obtain either recent topographical maps or aerial photography of the study area.
- 1.8 In order to prepare a base map we obtained Mouza maps of most of the CCC area at a variety of scales. These maps were reported to have been prepared in the early 1980s and were the latest mapping obtainable. By reducing them to a single scale we were able to join them to form a base map at 1:20,000-scale, adding information from other maps and from our own observations as necessary and transferring contours from the 1:3960 maps. This information was also supplemented by our own surveys which are presented as volume IV of this Report.

#### HISTORY OF PREVIOUS WORK

- 1.9 Previous studies of the stormwater drainage and flood control problems of Chittagong include :
- (a) Storm Drainage and Flood Control Master Plan and Feasibility Report, J.R. Snell, 1969;
  - (b) Drainage and Flood Control Project, Feasibility and Definite Project Report BWDB, 1972;
  - (c) Sewerage and Sanitation System for Chittagong Metropolitan Area, World Bank, 1984;
  - (d) Chittagong Municipal Services Sub-project, Final Engineering Design. L. Berger, 1987.
- 1.10 The report by J.R. Snell proposed a comprehensive Master Plan but very few of the works put forward have been constructed. A coastal embankment was built in 1978 but it proved inadequate in the face of ensuing cyclones. In general the Master Plan

was not followed and most of the measures taken to relieve urban stormwater drainage problems have been on an *ad-hoc* basis. Since publication of this Master Plan development of the city has increased in area and in density the most noticeable result being greater run-offs in the urban area.

- 1.11 Following the report by L. Berger the Environmental Improvement Project was set in motion in 1989, and it is due to run to 1997. The project includes a series of drainage works, listed in Chapter 2, which are aimed at alleviating annual flooding in the city.
- 1.12 Under the Cyclone Relief Emergency Project a new coastal defence embankment is now being constructed.
- 1.13 The works constructed and proposed under the Environmental Improvement Project and the Cyclone Relief Emergency Project form part of the Master Plan now proposed. Their cost is not included in the estimated capital works programme but has been taken into account in our review of the possible financing arrangements for the Master Plan.

#### REPORT LAYOUT

- 1.14 Our report is presented in four volumes :
 

Volume	I	Executive Summary
Volume	II	Main Report
Volume	III	Appendices
Volume	IV	Maps
- 1.15 The eight chapters of Volume II are :
  1. Introduction
  2. Existing Situation
  3. Hydrological and Geotechnical Studies
  4. Development Plan
  5. Alternative Solutions
  6. Proposed Master Planning
  7. Priority Project
  8. Implementation
- 1.16 Chapter 2 reviews existing drainage and flood defence works. Chapter 3 assesses rainstorms, river and sea levels to be used and Chapter 4 indicates the nature of future development of the city to be assumed in preparing the Master Plan. Chapter 5 looks at alternative components of drainage works and selects the most economical. It further selects design rainstorms and river level return periods, and enumerates



possible solutions to drainage problems throughout the project area. Chapter 6 describes the chosen solutions which go to making up the Master Plan, and Chapter 7 describes the first phase project in more detail. Chapter 8 puts forward a programme for construction and expenditure over the next 22 years.

- 1.17 Volume III comprises fourteen appendices which give supporting information for the chapters in Volume II.
- 1.18 Volume IV consists of 192 maps produced by Bangladesh Survey Organisation for the purposes of our study.

#### **DESIGN PERIOD**

- 1.19 The Master Plan sets out a staged development of stormwater drainage and flood control works to meet the needs of the projected population up to the year 2015. For any large community such long term planning involves a degree to speculation regarding the way in which development will proceed. This is particularly true in Chittagong where the machinery for development planning is not well established. For this reason periodic review and re-appraisal of the Master Plan proposals should be made. Such re-appraisal will be necessary prior to the implementation of each stage of the Master Plan.



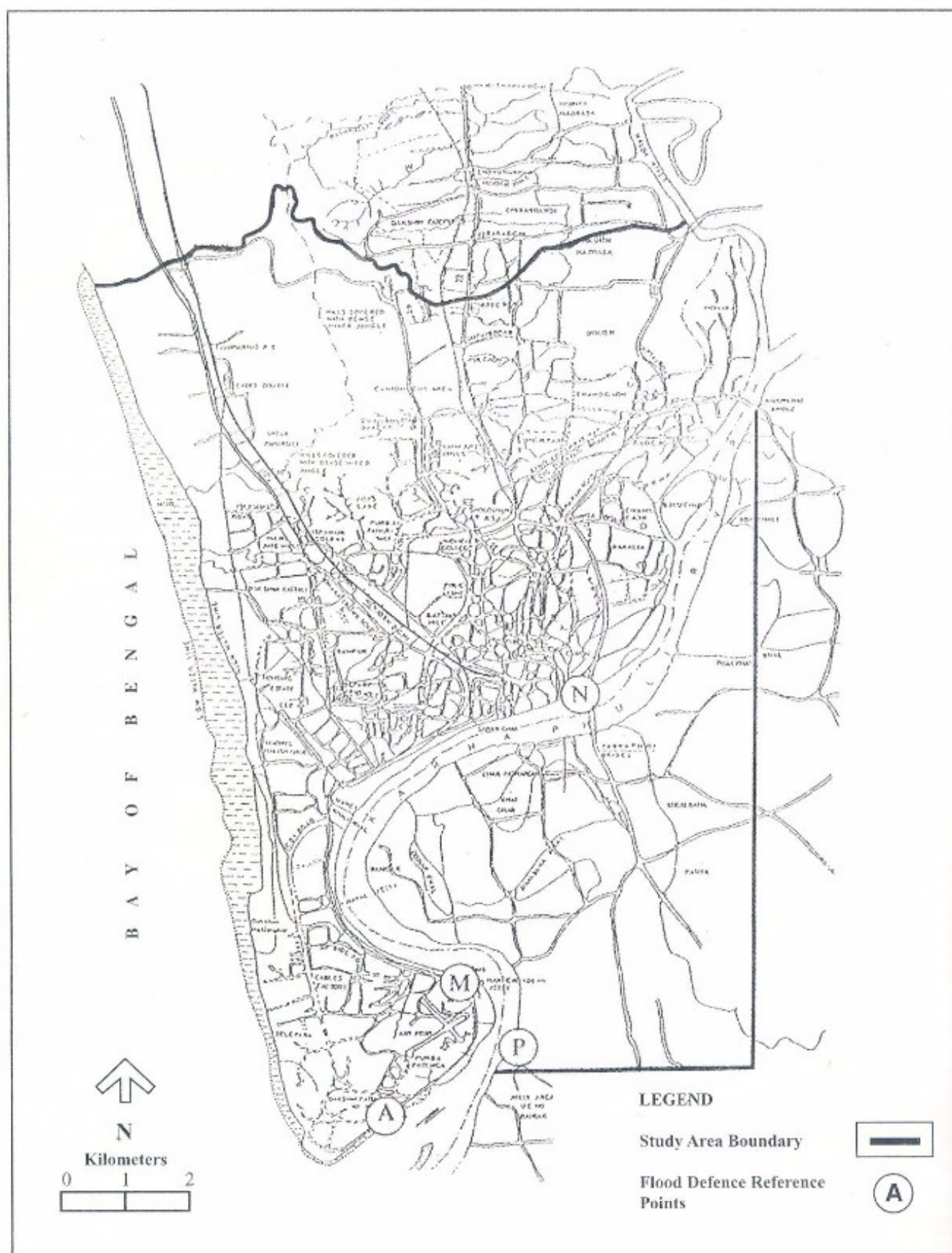


Figure 1.1 STUDY AREA