Government of the People's Republic of Bangladesh

Ministry of Local Government, Rural Development & Cooperatives

Local Government Division

KALAROA PAURASHAVA

MASTER PLAN: 2011-2031

March 2015

Technical Assistance: Local Government Engineering Department (LGED)

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KALAROA PAURASHAVA MASTER PLAN: 2011-2031

STRUCTURE PLAN

URBAN AREA PLAN:

- **Landuse Plan**
- **Transportation & Traffic Management Plan**
- **Drainage & Environmental Management Plan**

WARD ACTION PLAN

March, 2015

KALAROA PAURASHAVA

KALAROA, SATKHIRA

KALAROA PAURASHAVA MASTER PLAN: 2011-2031

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EXECUTIVE SUMMERY

Kalaroa Paurashava under Satkhira District is located in the center of Kalaroa Upazila. It is situated at the bank of Betraboti River with an area of 14.878 sq km or 3676.45 acres. It is main focal point of economic growth of Kalaroa upazila. Kalaroa Paurashava is connected to Satkhira Sadar and Jessore District Headquater by a Feeder road. It is about 20 km from Satkhira City. Geographically it is located between 22º 52' north latitude and 89º 02' east longitude.

The Structure Plan for Kalaroa Paurashava will provide a long term development strategy for 20 years up to 2031 for the development of the Paurashava area of 14.878 sq km or 3676.448 acres with an estimated population around 34524.

According to the BBS 2011, the population of Kalaroa Paurashava as per recorded in is 27250 of which 13510 (49.58%) are male and 13740 (50.42%) are female. The population of Kalaroa is Muslim, Hindu, Buddhist and others. Kalaroa is rich in a diversity of indigenous peoples, heritage, and culture.

Kalaroa come into existence in 1851 as Thana upgraded to upazilla 1983. That Paurashava was established in 1990 as a 'C' class Paurashava. Currently it is categorized as 'B' class Paurashava.

Under such circumstances a Master Plan can help creating advantages for living and working in the Paurashava that will indirectly help attracting investment for economic growth leading to employment generation. There are not very much development activities going on and there is also lack of organized system of development activities at present. Current development emphasizes only on road and structural development. Other utilities are neglected here. The proposed Master Plan will induce such development activities that will ensure proper provisions of utility services, urban services and with these; social development. It will also ensure good and automated governance of the Paurashava and ensure good collection and utilization of its resources and thus enhance the development activities.

The Master Plan is prepared in three tiers for the planning area of total 3646.45 acres. First one is Structure Plan, then Urban Area Plan and finally Ward Action Plan.

The Structure Plan for Kalaroa Paurashava will provide a long term development strategy for 20 years up to 2031 for the development of the Paurashava area of 14.878 sq km or 3676.448 acres with an estimated population around 34524. It provides the policies that will guide the future development of the Paurashava. In the Structure Plan of Kalaroa Paurashava 60% land is kept as urban area and the remaining as agricultural area and water body to support the future need for food and other agricultural products of the town and to facilitate the future drainage network. The Structure Plan proposes the restructuring of the organogram of the Paurashava and inclusion of town planning department comprising town planners. This will ensure the better implementation and monitoring of the plan. It also proposes the system of periodic review and updating of the plan and also the resource mobilization process.

Urban Area Plan consists three types of Plans; Land Use Plan, Traffic and Transportation Management Plan and Drainage and Environmental Management Plan. Under the Land Use Plan the future land use of the Paurashava is proposed according to the fixed standards during the interim phase of the Master Plan.

Land Use Plan proposes the Paurashava land to be earmarked under Urban Residential Zone and Rural Settlement. These two zones will form the future residential areas of the Paurashava. Proposals for other land uses like Commercial Zone, Education and Research Zone, Open Space, Circulation Network etc. are made. Under the Land Use Plan the development proposals to support the future needs of the people are also given. It is proposes one heavy industrial zone, one Paurashava market, stadium, hospital, waste dumping ground, college, vocational training institute, low income housing project, bus terminal, truck terminal, central parks, high school, primary school, playground, neighborhood park, kitchen markets playgrounds and many other facilities.

In the Traffic and Transportation Management Plan the Road Network Plan is proposed. The transportation facilities are proposed here in this plan. In the Road Network Plan of the Paurashava 47.21 km of road widening and 36.52 km new road construction is proposed. The road hierarchy is proposed in this plan too. The proposed road network will comprise of primary road (120 ft to 100 ft RoW), secondary road (and 80 ft to 60 ft. RoW), and local road (40 ft to 20 ft. RoW). The proposed road network and the transportation facilities along with the proposed management system will provide a good system of management for future traffic and transportation problems. The proposed transportation facilities include truck terminal, auto-rickshaw/tempo stands, parking area and some other proposals.

Under the Drainage and Environmental Management Plan the drainage network of the Paurashava is proposed. This plan will analyze drainage aspects in the planning of the Paurashava, study geological fault and lineament of the project area and its surroundings, study the existing water development, flood protection and flood control project (if any) in the area and their impacts in the Paurashava plan, present planning options for drainage of the future Paurashava area, study conservation of the natural resources like parks, open space, water bodies, existing ponds etc. and conserve place of historical, architectural (if any) and agricultural importance including natural fisheries. At present there is only 10.03 km of pucca drain in the Paurashava and the natural canals cover 7.02 km. This network is not enough to support the present need and will not be suitable to support in the future. That is why the consultants proposed a comprehensive network of drains that comprises 7.83 km of primary drain, 8.66 km of secondary drain and 12.16 km of tertiary drain are proposed in the plan to support the drainage network.

Ward Action Plan is the third and final tier of the Master Plan which prepared including the proposals that will be implemented during the first to fifth year of the Master Plan period. Two or more Ward Action Plans will be prepared under this Master Plan to address the need of the people for the remaining fifteen year's period of the Master Plan. This first Ward Action Plan, which is described in this report, addresses the urgent needs of the people of the Paurashava and incorporates those in the Master Plan. It analyzes the immediate requirements of the people living in the nine wards of the Paurashava and then provides facilities in a manner that it supports the particular ward in the first phase of the Master Plan period of twenty years.

Previously no Master Plan was prepared for Kalaroa Paurashava town. This is the first Master Plan of the Paurashava prepared by LGED under Package 12 of the Upazila Towns Infrastructure Development Project (UTIDP). It is expected that the implementation of the plan will ensure planned development with compatible land use, development control, optimum utilization of land resources and socio-economic development of the urban dwellers.

Final Master Plan of Kalaroa Paurashava

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LIST OF ABBREVIATIONS AND ACRONYMS

3D	Three Dimensional
AAT	Arc Attribute Table
ADP	Annual Development Plan
BBS	Bangladesh Bureau of Statistics
BIP	Bangladesh Institute of Planners
BM	Bench Mark
BS	Bangladesh Survey
BTM	Bangladesh Transverse Mercator
BUET	Bangladesh University of Engineering and Technology
BWDB	Bangladesh Water Development Board
CPA	Critical Path Analysis
CPM	Critical Path Method
CS	Cadastral Survey
DD	Degree Decimal
DGPS	Differential Global Positioning System
DPHE	Department of Public Health Engineering
FDI	Foreign Direct Investment
FFYP	Fifth Five Year Plan
Ft	Feet
GDP	Gross Domestic Product
GIS	Geographic Information System
GO	Government Organization
Govt.	Government
GPS	Global Positioning System
H/Q	Head Quarter
HBB	Haring Bone Bond
ICT	Information and Communication Technology
Km	Kilometer
LCC	Lambert Conformal Conic
LGED	Local Government Engineering Department
LGRD&Co.	Local Government, Rural Development and Cooperatives
M	Meter
MDG	Millennium Development Goal
MIDP	Municipal Infrastructure Development Project
NGO	Non-Government Organization
O-D	Origin – Destination
PAT	Polygon Attribute Table / Point Attribute Table
PCU	Passenger Car Unit
PD	Project Director
PDB	Power Development Board
PERT	Program Evaluation and Review Technique
PMO	Project Management Office
PMU	Project Management Unit
PWD	Public Works Department
R&H	Roads and Roads Department
REB	Rural Electrification Board
RL	Reduced Level
RS	Revenue Survey
RTK-GPS	Real Time Kinematic Global Positioning System
SME	Small and Medium Enterprise
STM	Standard Transverse Mercator
ToR	Terms of Reference
TS	Total Station Survey
UDD	Urban Development Directorate
UTIDP	Upazilla Towns Infrastructure Development Project

Chapter 1

Introduction

In Bangladesh the present average urban growth rate is about 2.85% (World Bank, 2010). Present trend of population increase indicates that by 2020 about 40% of the total population will live in urban areas. According to a recent survey it was revealed that 45% of urban populations have access to potable water while have limited access to sewerage facilities. In addition inefficient transport management greatly contributes to the problems in traffic and transportation system. These aspects are not only influence our urban life but also arrest the national economic growth of the country. On the other hand, demand for urban service facilities has increased substantially because of the population expansion in urban areas. The expansion of urban economy leads to the growth of urban population and concomitant haphazard urban spatial growth without planning.

The urban centers are going to be the focus of future employment and economic regeneration. The population and economic growth, particularly, in large urban centers is likely to boost in next few decades creating increased burden on them. The smaller urban centers imbued with opportunities for investment and livable environment can help release pressure on big cities at the same time serve as growth poles for development of undeveloped hinterlands. Without adequate infrastructure and services provision to support the increasing population and activities the small urban centers, it would be difficult to turn urban centers as environmentally congenial livable places. Planned development of infrastructure and services and development control through land use plan is essential.

The present infrastructure provisions in Paurashavas are in a precarious state. Drains are mostly clogged that cannot drain out water during heavy rains, natural drainage systems have either been filled up or occupied by land grabbers creating water logging during monsoon. Traffic in Paurashavas is increasing day by day with the increase in population and demand. But the substandard road network can keep pace with the growing demand for movement; as a result congestion becomes a common problem. Road networks has not developed in planned and systematic way leaving room for traffic congestion that increases economic loss to the people due to travel delay. The land use development in the Paurashavas is unorganized and unplanned, which is a major source of environment deterioration. Building Construction Rules has not effectively enforced in Paurashavas.

It is high time to think about problems that might be emerged in future if they are not addressed now. To overcome all likely problems to come in future, the Paurashava should go for planned development through preparation of a master plan and move the development forward accordingly. The master plan can be prepared exercising the power conferred to them by the “Local Government (Paurashava) Act, 2009”. The Upazila Town Infrastructure Development Project aims to prepare master plan for 223 Paurashava upazila as for a period of next 20 years. The project keeps provision for a separate plan for land use control, drainage and environment, traffic and transportation management and improvement. The project aims to prepare a Ward Action Plan to ensure systematic execution of infrastructure development projects in future. There is also aim to prepare

proposals to enhance Paurashava revenue so that it becomes more capable of meeting its own capital needs. The master plan of Kalaroa Paurashava will suggest development of new roads and bridges/culverts, drainage facilities, streetlights, markets, bus stands, solid waste management, sanitation, water supply and other infrastructure facilities to face future needs.

1.1 Objectives

The objectives of Paurashava Master Plan are to:

- Find the development issues and potential of the Paurashavas and make a 20-year development vision for the development;
- Plan for the people of the town to develop and update provisions for better transport network, housing, infrastructure for road, markets, bus terminals, sanitation, water supply, drainage, solid waste management, electricity, education, leisure and such other infrastructure facilities for meeting the social and community needs of the poor and the disadvantaged groups for the better quality of life; and
- Prepare a multi-sector short and long term investment plan through participatory process for better living standards by identifying area based priority- Drainage master plan, transportation and traffic management plan, other need specific plan as per requirement in accordance with principal of sustainability.
- Provide controls for private sector development, clarity and security with regard to future development.
- Provide guidelines for development considering the opportunity and constraints for future development of Upazila Town.
- Prepare 20-years Master Plan to be used as a tool to ensure and promote growth of the city in line with the guideline principles of the master plan and control any unplanned growth by any private and public organization.

1.2 Approach & Methodology

The approach and methodology of planning that has been followed is worth mentioning here. Various studies are the integral part of the planning process, while the planning method covers a wide range of issues duly considered during the process of planning. In this Master Plan Preparation exercise, following Several-phases of planning methodology have been followed.

The methodology related for preparing the Master Plan/Urban Area Plan including Land Use Plan, Transportation and Traffic Management Plan, Drainage and Environmental Plan and Ward Action Plan for Kalaroa Paurashava was taken under the following sequential way.

Phase 1: Preliminary Visit to the Paurashava

At first, the planning goals and objectives were conceived, preparations were made. A preliminary visit was made by the team of consultants to acquire basic idea about the areas to be planned. The goal in this step was to conceptualize the planning process and the operational activities.

Phase 2: Organize Inception Seminar

After conceptualize the planning inception, Seminar was held at the Kalaroa Paurashava in which stakeholders was informed about the scope and Terms of Reference for the preparation of Master Plan and the output in this step was the preparation of an Inception Report.

Phase 3: Delineation of the Planning Area

Under the project (UTIDP), basing on existing condition, demand of Kalaroa Paurashava and potential scope for future development, study area have been delineated.

Methodology involved in the process of establishment of Bench Marks (BM) and demarcation of existing Paurashava boundary and proposed planning area for Kalaroa Paurashava is as follows:

A. Collection of Paurashava Gazette to identify the Existing Paurashava Area

B. Reconnaissance survey about Paurashava Growth Trend

C. Establishment of Bench Marks (BM)

- Site selection
- Construction and Installation of BM pillars
- Establishment of Coordinate of BM Pillars (x,y,z i.e. Northing, Easting and RL in meter)

D. Establishment of Ground Control Points (GCPs)

E. Demarcation of Paurashava and Planning Area

- Collection, Scanning and Digitizing of Mouza Maps
- Edit Plot Checking of Digitized Mouza Maps
- Geo-referencing of Mouza Maps
- Joining and Edge-matching of Mouza Maps

F. Participation of Paurashava in the Demarcation of Paurashava and Planning Area.

G. Preparation of GIS Map Layout.

Phase 4: Carry out Detailed Survey for Kalaroa Paurashava

A number of studies were conducted in order to prepare a database and get an insight into the existing conditions. The studies, however, have focused on three different but inter-related aspects; the physical condition of the town, the economic and social conditions of the people, and their perceptions about the problems and prospects of the town.

Data and information collected includes topography, physical features, physical infrastructures, land use, socio-economic and traffic and transportation situation of the study area. Detail Socio economic, Physical Feature, Traffic and Transport, Environment survey of Kalaroa Paurashava area have been conducted according to the approved format of ToR. Other relevant data have also been collected from primary and secondary sources. These surveys and analysis of data and information have helped to find out possible area of intervention to accommodate future population of the Paurashava.

Total station based advanced technology for topographic, physical features; land use surveys done along with household sample survey for socio-economic information were used in the study. The Physical Feature Surveys were conducted covering the entire area under the jurisdiction of Kalaroa Paurashava. The stepwise works for survey and mapping are as follows,

- Reconnaissance survey;
- Collection of Mouza maps;
- Identification of Ground Control Point (GCP) on the Mouza maps;
- Geo-referencing of Mouza maps;
- Preparation of Arc/Info coverage;
- Preparation Edit Plot of Mouza maps;
- Planning Area Demarcation from Paurashava Gazette and detail information from the Paurashava authority;
- Establishment of Reference Bench Marks in the Project area;
- Detailed Physical feature Survey (Point, Line, Closed boundary);
- Spot level/Land level survey
- Detailed Land Use, Socio-economic, Drainage and Environment, Traffic and Transport survey;
- Survey Data processing and Preparation of GIS database;
- Preparation of GIS based physical feature survey Map layout;
- Verification of map at field level;
- Map production (all Categories).

All these information were collected using the modern survey equipments (i.e. Total Station, RTK-GPS, etc.). As per ToR, to collect the topographic information, RTK-GPS and Total Station (TS) were used as advanced survey techniques.

The following variables were measured in topographic survey: Land level/spot level at an interval of 50m in general cases but for high undulated areas this regular interval were decreased as necessary. Alignment and crest levels (not exceeding 50m) of road, embankment and drainage divides were also considered during taking spot levels. Contour map was prepared using 0.3m contour interval. Besides, alignment of rivers, lakes, canals drainage channels and outline of bazaars, water body, swamps etc. were also recorded in the physical feature survey.

Land use survey covered different uses of land i.e. agricultural, residential, commercial, industrial, community services, educational, transport and communication, water body, vacant land and circulation network etc. Land Use Surveys were conducted by recording the current use of the land within the project area. Physical feature survey data and maps were used as the basis for land use survey.

The drainage information was primarily collected from the topographic and physical feature surveys. Some additional information has also been collected through key Informant Survey of knowledgeable personal of the Paurashava using an unstructured questionnaire.

Through the socio-economic survey data on population, family size, distribution of age/sex, occupation, household structure, dwelling occupancy, migration pattern, education status, Income and expenditure level, land ownership pattern, land value, health facilities, recreational facilities etc. were collected. Detailed traffic and transportation survey was conducted through traffic volume survey, origin destination (O-D) survey and speed survey, Congestion point, inventory of road networks etc.

Phase 5: Preparation of Base Maps and Survey Report

After conducting the all sorts of survey, processing and analysis of survey data of the planning area, base maps incorporating all the natural features and man-made infrastructures along with their alignment and essential attribute were prepared by the consultant. The final outcome of this phase is preparation of survey report which illustrates the components of survey in order to understand the existing condition of the project area.

Phase 6: Preparation of Interim Report

This is an intermediary phase towards preparation of Master Plan for Kalaroa Paurashava which involves projection of population and landuse, thorough review of existing policies relevant to the different development sectors, assessment of institutional capacity of the Paurashava. An overview of recent past budget and the list of existing/recent past infrastructure related development schemes undertaken by the Paurashava have also been reviewed at this phase to get an idea of financial capacity of the Paurashava Authority.

Phase 7: Analysis and Projection of Existing and Future Condition

This phase involves analysis of existing trend of growth based on maps, BBS data and other primary and secondary data relevant to the project area and projection of future requirement through assessing the growth direction, planning standards provided by LGED and the projected population for the planning period.

Phase 8: Public Consultation Meeting

The eighth phase of the methodology of Final Master Plan is to conduct ‘Public Consultation Meeting’ where discussion on existing facilities and services, future requirements, identification of proposals on maps and field verification have been conducted. The proposals have been finalized after conforming and incorporating the views and ideas of the stakeholders.

Phase 9: Preparation of Final Master Plan for Kalaroa Paurashava

The ninth phase of the methodology is ‘Preparation of Final Master Plan Report’. This portion of the methodology is directly linked with three different issues, which are – Structure Plan, Urban Area Plan and Ward Action Plan.

In the **Structure Plan**, Paurashava’s existing trend of growth and the development problems are identified; whereas, the future land use, future population and the future growth by 2031 of Kalaroa is projected. Finally, a Policy Zoning Map is prepared and

optimum use of urban resource strategy is taken to implement and ensure better urban environment.

The **Urban Area Plan** is composed with four parts, which are Land Use Plan, Transportation and Traffic Management Plan, Drainage and Environmental Management Plan and Plan for Urban Services

Land requirements for each broad category of land uses have been determined based on projected population for a time period of 20 years and the recommended Planning Standards provided by LGED in the **Land Use Plan**. After estimating land requirements, allocation of uses is made based on land suitability. A land suitability analysis is performed on a qualitative basis through field visits, consultation meeting, analysis of topographic map, physical feature map and soil condition to justify the suitability of land for a specific use. Land allocation is a process which depends on the demand and supply of land. Whereas land suitability yields information on supply, land requirements indicate demand of land available for development. Final land allocation or land use recommendation for competing uses is then shown on proposed land use plan map and described in detail in the explanatory report.

The first step of the methodology of **Transportation and Traffic Management Plan** is to identify the existing transport condition, which is the result of O-D survey, traffic survey at intersection, traffic survey at links and speed study; have already described in the survey report. In the next step, the future projection of transportation network and traffic demand is identified, which is described in the interim report. The third phase of the study is to adopt new traffic and transportation management plan, which is prepared based on future projection. After that, some strategies on transportation system management (TSM) are undertaken. Finally, plan implementation strategies are espoused based on both transportation management plan and transportation system management.

Preparation of the **Drainage Plan** involves (I) analyzing the existing conditions related to drainage facilities and the flood management (II) identifying major drainage outfalls and on the basis of the outfalls splitting the total drainage area into a number of drainage zones (III) defining all pertinent design criteria and (IV) defining drainage facility requirements and sizing. The drains are designed to collect excess rainfall that comes as surface runoff from urban area, convey the runoff and finally discharge them to outfalls. The design of drains involves hydrological computations of rainfall intensity, its frequency of occurrence, duration etc., and the total runoff of a particular area.

The **Environmental Management Plan** consists of the Supplementary Living Environment Survey, the Comprehensive Ecological Survey and the Water Quality Survey. The Supplementary Living Environment includes water supply, land pollution, sewerage and sanitation, solid waste management, and resettlement of population due to construction of canals and primary drains. The Comprehensive Ecological Survey aims at facilitating comprehensive environmental assessment by subsequent urbanization and implementation of the drainage on the ecological elements of fauna and flora, agricultural and aqua cultural resources etc. The Water Quality Survey is the sampling and analysis of surface water from rivers, natural canals, ponds etc., and from ground water. These are required to be done to ensure necessary urban environment enhancement measures.

In case of **Urban Services**, the existing condition of urban services is analyzed. After that, future urban service requirement is estimated and some proposal has provided. Finally, to implement the proposal some strategies are undertaken.

The last step of the methodology is **Ward Action Plan,** conceptualize the content and background of the plan. In the next step, the linkage with Structure Plan & Urban Area Plan is identified. The final phase of the study is to adopt ward action plan in details. The proposal and planning, priority tasks and cost estimation are incorporated here to get a pictorial view of the Ward Action Plan.

1.3 Scope of work

The scope of work under this Consultancy services will cover all aspects related to the preparation of Master Plan/ Urban Area Plan which will include, land Use Plan, Traffic Management Plan, Drainage and Environment Plan and Ward Action Plan for the listed Upazila Town. In order to prepare plan the activity will contain but not limited to the following:

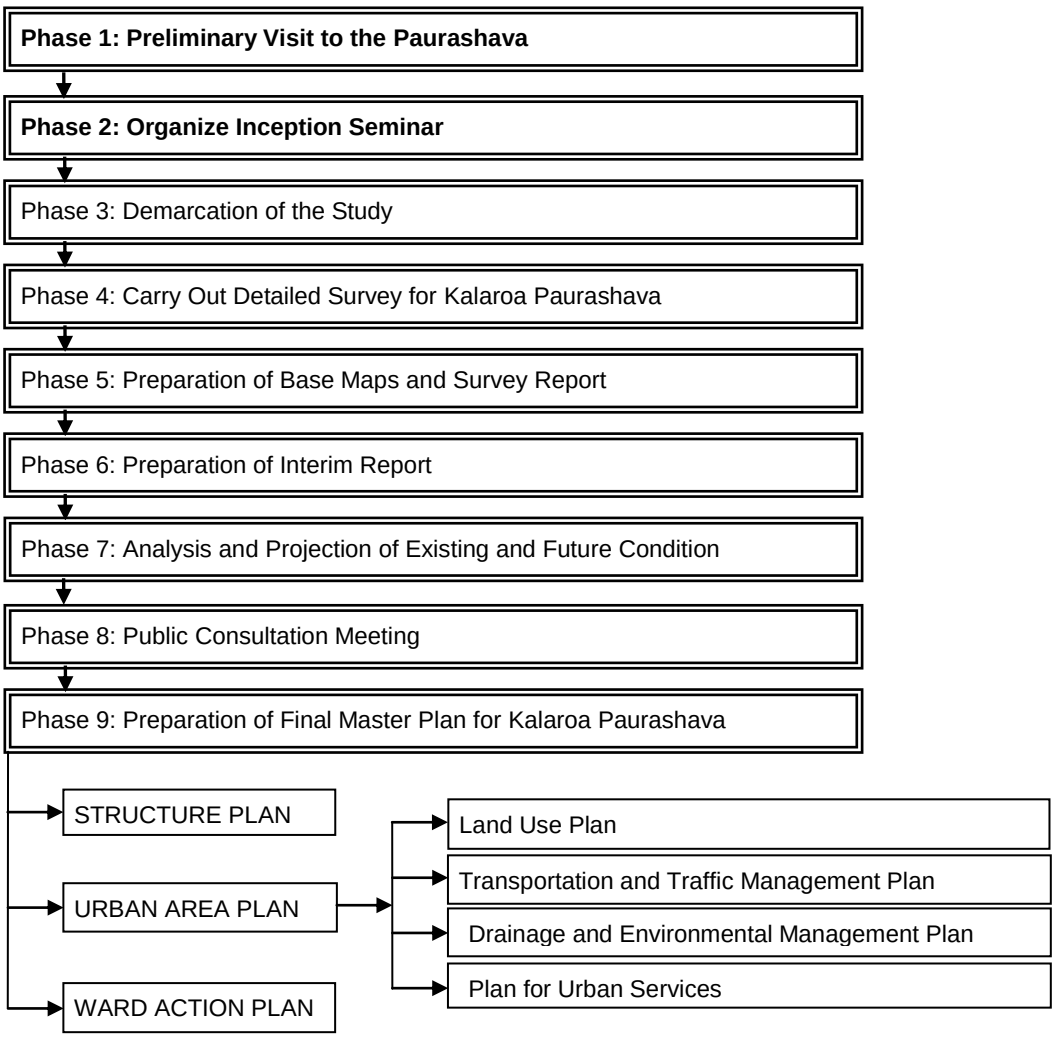

Figure 2.1: Flow Chart of Methodology

- Visit the Paurashava included under the package work and list the passive name of Paurashava that will undertake preparation of Master Plan. In case if any Paurashava has already prepared Master Plan it has no need for Paurashava of Master Plan then it will be excluded from the package, written opinion of the concerned Chairman of the Paurashava whether or not Master plan Preparation will be included. A copy of list of Paurashavas feasible for preparation of Master Plan will be submitted to the office of the PD, UTIDP.
- Organize an inception Seminar at the Paurashava level and inform of the Paurashava about the scope and terms of reference for the preparation of Master Plan. Make a thorough investigation and based on potential scope and opportunities available in the Paurashava develop a 20 years development vision for the Paurashava liking the ideas and view of the Paurashava.
- Determine the study area based on exciting condition, demand of the Paurashava and potential scope for future development. Carry out detailed socio-economic Demographic and Topographic survey of the Paurashava area following approved format and collect data from primary and secondary sources. Analyze such data and information, find out possible area of intervention to forecast future population of such Paurashava (15-20 years), vis-a-vis assess their requirement for different services, physical and social infrastructure facilities, employment generation, housing right of way and land requirement for the existing and proposed roads, drains, play grounds, recreation centers and other environmental and social infrastructure.
- Identify and investigate the existing natural and manmade drains, natural river system, assess the extend and frequency of flood, determine area of intervention. Study the contour and topographic map produced by the relevant agencies and also review any previous Drainage Master plan available for the Paurashava.
- Prepare a comprehensive (storm water) Drainage master plan for a plan period of 20 years. In such exercise consider all relevant issues including discharge calculation, catchment area, design of main and secondary drains along with their sizes, types and gradients and retention areas with primary cost estimates for the proposed drainage system.
- Recommend Planning, institution and legal mechanism to ensure provision of adequate land for the establishment of proper right of way of (storm water) drainage system in the Paurashava.
- Collect and assess the essential data relating to existing transport land use Plan, relevant regional and natural highway development plan, accident statistics, number and type of vehicle registered of each Paurashava.
- Assess requirements of critical data and collect data through reconnaissance and traffic survey, which should estimate present traffic volume, forecast the future traffic growth, identification travel pattern, areas of traffic conflict and their underlying cause.
- Study the viability of different solution for traffic management and develop a practical short term traffic management plan, including one way systems, restricted access for large vehicles, improved signal system traffic islands, roundabouts, pedestrians

crossing, and deceleration lanes for turning traffic, suitable turning radius, parking policies and separation of pedestrians and rickshaws etc.

- Assess the non-pedestrian traffic movements that are dominated by cycle rickshaw. Special recommendations should be made of as to how best to utilize this form to transport without causing unnecessary to other vehicles. Proposal should also consider pedestrians and their safety, with special children.
- Assess the current land use with regard to road transportation, bus & truck station, railway station etc, and recommend action to optimize this land use.
- Prepare a road net work plan based on topographic and base map prepared under the project. Recommend road development standards, which will serve as a guide for the long and short term implementation of road. Also suggest Traffic and transportation management plan and also suggest a traffic enforcement measure to be taken.
- Prepare the Master Plan with all the suitable intervention, supported by appropriate strategic policy, outline framework, institutional arrangement and possible source of fund for effective implementation of the plan.
- Prepare a plan to set out proposed Master Plan at 3-levels namely Structure Plan, Master Plan/ Urban Area plan and Ward Action Plan.
- At the first level, work out frame strategy policy for the preparation of a structure plan for each Paurashavas under the package. As a follow up of structure Plan prepare a master plan consisting a land use plan. Transportation and traffic Management Plan, Drainage and Environment Management Plan and Ward Action plan.
- Make a total list of primary and secondary roads, drains, and other social infrastructures for each Paurashava for a plan period of 20 years. Examine and classify according to the existing condition, propose long, medium and short-term plan and estimate cost for improvement of the drain and alignment and other infrastructures.
- In line with the proposed Master plan propose a Word Action Plan with list of Priority schemes for the development of roads, drain, traffic management and other social infrastructures for implementation during the first five years of the period.
- Organize with the help of concerned Paurashava at least 2 public consultation meeting/seminar one for discussion on interim report and the other on draft final Report on the proposed Master plan. Integrate beneficiary's point of view in the plan with utmost careful consideration.
- Prepare and submit Master plan and Report with required standards as required by the TOR.

1.4 Organization of the Report

The Kalaroa Paurashava Master plan Report is organized into three main parts namely- Part A: The Structure Plan, Part B: The Urban Area Plan and Part C: The Word Action Plan.

Part A: is the Structure Plan is a policy guideline plan for next 20 years period. It describes Paurashava's existing trend of growth and the development problems are identified; whereas, the future land use, future population and the future growth by 2031 of

Kalaroa is projected. Finally, a Policy Zoning Map is prepared and optimum use of urban resource strategy is taken to implement and ensure better urban environment.

Part B: is the Urban Area Plan. The Urban Area Plan is for 10 years period up to 2021. It has been divided into four main sub-parts as follows: 1) Land use Plan, 2) Transportation and Traffic Management Plan, 3) Drainage & Environmental Management Plan and 4) Plan for Urban Services.

1) The Land use Plan identifies approaches of planning, existing and projected land use and proposed land use. Requirement of land for different purposes, land use zoning and plan implementation strategies are also included here.

2) The Transportation and Traffic Management Plan includes existing conditions of transportation facilities, intensity of traffic volume, degree of traffic congestion and delay, analysis of existing deficiencies, travel demand forecasting for next 20 years, future traffic volume and level of services and transportation development plan. Moreover, transportation system management strategy and plan implementation strategies are also presented in this plan.

3) Drainage and Environmental Management Plan again subdivided into two parts - Drainage part and Environment part.

Drainage Management Plan describes the existing drainage network, land level and topographic contour. Plan for drainage management and flood control and plan implementation strategies are the components of the drainage part.

Environmental Management Plan describes the existing environmental condition, solid waste and Garbage disposal, environment pollution, water logging, natural calamities and localized hazards, plan for environmental management and pollution control and plan implementation strategies are the key issues of the environment part.

4) Plan for Urban Services describes the existing condition and demand of the Services, projection on existing and proposed Urban Services, Proposals for Urban Services and Implementation, monitoring and evaluation of the Urban Services Plan are the key issues of this part.

Part C: is the Ward Action Plan. The Ward Action Plan is spanning for the 5 years period. The Structure Plan paints the broad picture on the future pattern of housing, jobs, transport, services and the environment. Ward Action Plan is much more specific. They tackle the problems and opportunities associated with individual communities and show exactly where it apply. The proposal and planning, priority tasks and cost estimation are incorporated here to get a pictorial view of the Ward Action Plan.

Chapter 2

Introduction to Structure Plan

2.1 Background of the Paurashava

Kalaroa Paurashava under Satkhira District is located in the center of Kalaroa Upazila. Kalaroa Township located beside the Betraboti River with an area of 14.878 sq km or 3676.448 acres. The Paurashava is comprised of 9 Wards and 9 Mouzas. It lies on 22º 52' north latitude and 89º 02' east longitude. Location of the Paurashava is showed in Map 2.1 (Location Map of the Paurashava).

According to the BBS 2011, the population of Kalaroa Paurashava as per recorded in is 27250 of which 13510 (49.58%) are male and 13740 (50.42%) are female. The population of Kalaroa is Muslim, Hindu, Buddhist and others. Kalaroa is rich in a diversity of indigenous peoples, heritage, and culture. At present, the density of population is 1830 per sq.km.

Kalaroa come into existence in 1851 as Thana upgraded to upazilla 1983. That Paurashava was established in 1990 as a 'C' class Paurashava. Currently it is categorized as 'B' class Paurashava.

The development scenario of Kalaroa Paurashava shows a very grave situation. The town has evolved as an administrative center of Upazila Parishad. No other factor lies behind the growth of the town. The roads and other infrastructures have been developed for functioning of the Upazila Headquerters. Residential and commercial development has taken places following the road network leading to ribbon development. The houses have built in haphazard manner without considering any planning standards and provisions.

The main and secondary drains and natural streams in the Paurashava Town do not function as an integrated drainage system. Encroachment on drainage reservations causes inundation to many areas, including houses and roads, during heavy storms. There are very few roadside drains only in the central part of the town.

Equally, the traffic and transportation problem in Kalaroa has been continuously increasing as the development and management of road network has not been commensurate with the increasing demand for its usage. Traffic congestion, accidents, pedestrian and parking difficulties, air and noise pollution are among the problems. In the absence of proper Master Plan construction of all types of infrastructure like houses, roads, drains, markets are going on in unplanned pattern. This situation is creating an adverse effect in the original landscape thereby creating environmental hazards.

Map 4.1: Location Map of Kalaroa Upazila within Bangladesh

2.2 Philosophy of the Master Plan

The Philosophy behind Kalaroa Paurashava Master Plan lies in the very motive to community welfare through a process of spatial organization, environmental improvement and provision of amenities to the future generations.

Planning for the future should be based upon enhancing the quality of life and create all the possible facilities such as residential, commercial, educational, recreational, infrastructural, utilities etc.

Like any town Kalaroa also wish to promote economic and social prosperity in this town, and thus continually strive to balance quality of life issues with prosperity. To that end, it believes the following considerations are critical:

- That any development should be harmonious, and aesthetically pleasing, as well as consistent with the character of the town;
- That the land uses such as residential, commercial, industrial etc. should be environmentally safe and compatible with existing structures, terrain and landscape;
- That it must keep the air, groundwater, khal, beel and other surface waters clean and safe.

2.3 Vision & Objectives of the Structure Plan

Vision:

- The Vision seeks to encapsulate the outcomes sought through the combination of objectives and strategies contained in this Structure Plan. The vision diagramed in the Structure Plan shows changes and choices about how our Paurashava town might develop. The Plan reflects significant decisions made in several key areas:

- Develop the Paurashava in the most planned manner by controlling the unplanned and haphazard development and manage the land uses in the most compatible manner so that it can save our precious agricultural land.
- Reduce the increasing pressure of population by controlling density and also to reduce population influx pushing towards the capital city.
- Develop the transportation network and to provide the different utilities and services.
- Amenities of the Paurashava are to be increased and kept provision of open spaces, play fields and recreational areas for all class of people.
- Promote income-generating activities for the low-income people within the Paurashava jurisdiction.
- Indicate the direction of growth and commercial development patterns.
- Develop the Paurashava as a self-dependent entity.

Objectives:

The purpose of the Structure Plan is to outline a preferred pattern of development from the perspective of the Paurashava as a service provider and planning authority. The objectives of the Structure Plan are identified as follows:

- Accommodate future residential, commercial and industrial development in appropriate locations.

- Manage the future growth through proper planning and appropriate development controls
- Preserve high value agricultural lands, natural features and open spaces.
- Ensure optimum use of urban land resources through proper development strategies.
- Discourages the sitting of land uses that are incompatible with adjacent land uses
- Seek the options for enhancing the non-agricultural economic activities and employment opportunities.
- Enhance the connectivity of the Paurashava in the regional transport network as well as among different areas/neighborhood within Paurashava boundary.
- Promote a livable living environment free from pollution, hazard and disaster.
- Ensure public safety and security from fire extinguishing, accidents etc.

2.4 Content and form of Structure Plan

Structure Plan is basically concerned with development of broad strategies for managing and promoting efficient urban development over the long term and attempts to integrate economic, physical and environmental objectives. Thus, Structure Plan provides a broad frame work for development activities over a long period of time in and around the Kalaroa Paurashava.

The process includes studies on future growth potentials of the area/regions. It then identifies basic strategic options available to accommodate the anticipated growth. After evaluation the preferred strategic option is accepted. The preferred strategy then identifies spatial and other structural issues relating to the overall development of Kalaroa Paurashava Town. It also provides area-wise strategies for expansion of different urban activities in space. The Structure Plan also outlines major sectoral policies to guide development in the desired manner over a longer period of time.

However, Kalaroa Structure Plan is focused primarily on the physical form and development pattern of the Paurashava Urban Center on the Maps and Reports that sets forth a basic framework, showing how Kalaroa Paurashava should grow and evolve over the next 20 years. It will serve as a blueprint towards the desired future described in the Vision & Goals element of urban center.

Chapter 3

Paurashava's Existing Trend of Growth

3.1 Social development

Kalaroa Paurashava is inhabited by cent percent local people who have been inherited their land for a long time. The social composition is from rich to poor and different religious groups are living together. Kalaroa Paurashava was established in 1990. So the socio-economic data of Kalaroa Paurashava is available in BBS 2011. However, some social data of the Paurashava has presented below.

Population

According to the BBS, 2011 (Satkhira District), the population of Kalaroa Paurashava as per recorded in 2011 is 27250 out of which 13510 (49.58%) are male and 13740 (50.42%) are female. The population of Kalaroa is Muslim, Hindu, Buddhist and other tribal people. At present, the density of population is 1830 per sq.km.

Age-Sex structure

According to BBS 2011, combined age-group 0-9 comprises 17.7% and the age- group 10-19 years comprises the 21.0% of the total population of the Paurashava. The age-group 20-49 shows 47.4% of total population. The age group 50-64 is another group to be mentioned here which comprises the 9.3%. Besides, the population above 65 years is found to comparatively lower constitute only 4.7% of the population of the Paurashava.

Household

According to BBS 2011 the total household of Kalaroa Paurashava is 6570 with average household size is 4.15.

Education

According to BBS 2011 an increasing trend of literacy is observed in the Kalaroa Upazila over the decades. The literacy rate is 61.3% in 2011 against 57.21% in 2001. It appears that the literacy rate has increased for both sexes in 2011 over 2001.

In the project area it is found that about 88.09 percent people have attained education level ranging from primary level to higher education. Out of the total sample population 11.91 percent never attended school. People with primary level education (Class I-V) accounts 40.14 percent. People with high school level education (Class VI-X) constitute 28.2 percent. About 14.67 percent people are reported to have attained higher secondary level education. About 5.08 percent people are with above higher secondary education level.

There are in all 47 educational establishments in the project area. It has a total 6 primary schools, 10 high schools, 6 colleges and 4 Madrashas. The area is not served by any academic institute of national importance. Among NGOs BRAC has significant role in education for poor and deprived children. Several numbers of schools by BRAC are found

in different part of the town.

Income Level

The socio-economic survey reveals that more that 11.3 percent household has a monthly income of Tk. 5000 or below and may be classified as poor. The people with income ranging from Tk. 5001-10000 constitute 53.5 percent household. The high income people with above Tk.15000 constitute only 15.4 percent households. It also reveals that mean monthly income of the project area is Tk.7483.35.

Religion

According to latest population census report (2011), 90.20% of the population of this Paurashava belongs to Muslim community and 9.72% to Hindu community. Population belonging to other religion such as Christian (0.08%) and Buddhist are very insignificant in number.

Occupation

People are engaged in different activities for earning their livelihood such as agriculture, industry, construction, business, service etc. However, most of the people belong to 'non-working group' and 'other working group' categories. Majority of the people belong to 'agriculture' category among the main occupational groups categorized in BBS (2011).

Land ownership and value

The cent percent people of Kalaroa Paurashava are local. The occupied inherited land areas and have been changing the ownership due to sale and purchase.

From the socio-economic survey it has been found that Average value of habitable land is Tk. 61000.00 per decimal. In Kalaroa Paurashava, medium high land is Tk.25000.00 to Tk.94500.00. The value is seems to be slightly high because there may be presence of few commercial land under this category. The value of land depends on different existing and future opportunities.

3.2 Economic development

Economic development is the increase in the standard of living of people. Its scope includes the process and policies by which a nation improves the economic, political, and social well-being of its people. Economic development typically involves improvements in a variety of indicators such as rates, life expectancy, and poverty rates. A country's economic development is related to its human development, which encompasses, among other things, health and education. These factors are, however, closely related to economic growth so that development and growth often go together.

In Kalaroa Paurashava, an economic development has been taken place over last few decades. Being located in a strategically important position the town has been evolved as a small trade and agro-based industry. Economic base of the Paurashava has been gradually shifting from traditional agriculture to commerce, business and other non-agricultural activities. Furthermore, Kalaroa is a business center of HYV of seeds, pesticides and chemical fertilizer for the respective region. This ultimately raises the both the agricultural productivity and business outcome. The geographical location of the Paurashava and its well connectivity in the regional set-up are identified as prime mover to

raise the economic growth of the Paurashava. Infrastructural development as an administrative center of Upazila Headquarters is identified to be one of the fundamental reasons behind such economic development. After establishment of Upazila, this area has been developed as a hub of small trade and business of the entire Upazila. However, the central part of the Paurashava is found to have high economic growth compared to other parts of the town.

3.3 Physical infrastructure development

Physical infrastructures includes different type of natural features e.g. water bodies and man-made structures e.g. buildings, roads, bridges, culverts, canals, drains, embankments, sewerage lines, industries, offices, institutions, health centers, storage/ godowns etc.

From survey report, one River e.g. Betraboti River and few other khal are identified as natural water bodies. The length of those natural water bodies has measured as 6.03 km passing through the Paurashava.

In the Kalaroa Paurashava over the last few decades as many as 12970 number of structures has been developed of which 11641 residential buildings, 821 commercial buildings, 91 industrial buildings, 94 educational buildings, 79 community facility structures, 25 bridge & culverts, 10.909 km pucca drain and 91.30 km (61.64 acres) road has been developed. It is found that the physical growth of the town is mainly formed through the circulation network in a linear pattern. There is a cluster of development in the core part of the Paurashava surrounding the main bazar in Jhikra and Morarikathi Mouza.

3.4 Environmental growth

The term environmental includes rainfall, geological condition, surface and ground water pollution, water bodies, drinking water quality, sanitation, land pollution, air pollution, noise pollution, flooding, water logging, drainage blockage, natural and manmade disasters, collection and disposal of solid waste. Environmental growth is means to minimize the adverse environmental impacts on land pollution, water and air quality and biodiversity resources by energy usage, transport network, waste management, slum improvement, disaster mitigation etc.

The urban environment of the Kalaroa Paurashava includes both built and natural environment. Built environment includes waste management, water, air quality, energy usage, transport network, slum improvement and disaster mitigation. The urbanization where the built environment overburdens the natural environment cannot be sustainable. So in every phase of planning processes all these environmental issues will be evaluated and proper measure will be taken to minimize the adverse environmental impacts on land pollution, water and air quality, biodiversity resources, transport network, waste management, slum improvement, disaster mitigation etc.

3.5 Population

According to Population Census 2011, the total population of Kalaroa Paurashava is 27250 of which 13510 (49.58%) is male and 13740 (50.42%) are female. Ward wise distribution of population is shown in **Table 3.1**. Most of the populations of Kalaroa are Muslim; there is also Hindu, Chistians. At present the density of population is

1830 per sq.km. As per Population Census 2011, total household of Kalaroa Paurashava is 6570 and sex ratio is 98.33. During the period 2001 to 2011, population increased in Kalaroa Paurashava at the rate of 1.19 percent per annum for both sexes. The Population growth trend of Kalaroa Paurashava is shown in **Table 3.2**.

Table 6.1: Ward-wise Distribution of Population

Ward	Population' 2011					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Ward No.01	1666	6.11	1556	5.71	3222	11.82
Ward No.02	1901	6.98	2009	7.37	3910	14.35
Ward No.03	1952	7.16	1964	7.21	3916	14.37
Ward No.04	870	3.19	925	3.39	1795	6.59
Ward No.05	1431	5.25	1413	5.19	2844	10.44
Ward No.06	1569	5.76	1580	5.80	3149	11.56
Ward No.07	1599	5.87	1650	6.06	3249	11.92
Ward No.08	1440	5.28	1494	5.48	2934	10.77
Ward No.09	1082	3.97	1149	4.22	2231	8.19
Total	**13510**	**49.58**	**13740**	**50.42**	**27250**	**100.00**

Source: BBS, 2011

Table 6.2: **Population Growth Trend**

Census Year	1981	1991	2001	2011
Population	13189	18346	24209	27250

Source: BBS, 1991, 2001 & 2011

3.6 Institutional capacity

In general terms, capacity can be defined as "the ability to perform functions, solve problems and set and achieve objectives". Capacity is systemic, so, in some sense, all dimensions of institutional capacity deserve attention. Kalaroa Paurashava consists of 9 wards. It has one elected Mayor, 9 elected councilors and three reserve women councilors. There are total 12 numbers of employees in Paurashava (**Table 3.3**).

Table 6.3: **List of Existing Manpower**

Designation	Number
Asstt. Engineer	01 Person
Sub-Asstt. Engineer (civil)	01 Person
Work Assistant	01 Person
Secretary	01 Person
Head Assistant	01 Person
Account Officer	01 Person
Tax Assessor	01 Person
Tax Collector	01 Person
Sanitary Inspector	01 Person
MLSS	02 Persons

Source: Kalaroa Paurashava, 2011

Existing logistic support of Kalaroa Paurashava is not satisfactory. To run the Paurashava smoothly with its multilateral function, the existing logistic support/ equipment should be improved in such a way that no function can be left. However the existing logistic support/ equipment of Kalaroa Paurashava are given in **Table 3.4** below:

Table 6.4: **Logistic support/Equipment of Kalaroa Paurashava**

Sl. No.	Type of Equipment	Number
01	Road Roller	1 no.
02	Garbage Truck	1 no.
03	Hand Trolley	15 nos.
04	Computer	1 no.

Source: Kalaroa Paurashava, 2011

The institutional capacity of the Kalaroa Paurashava at present is very limited. It is observed that the staff numbers are not sufficient with regards to work volume (duty and responsibility) of Paurashava. To commensurate with the modern scientific advancement the Paurashava is lagging behind in terms of logistics. Its computer facility, GIS software, use of satellite image, modern survey equipment, internet etc. are deplorable. To run the Paurashava smoothly with its multilateral function, the existing logistic support/ equipment should be improved in such a way that no function can be left.

The Paurashavas or Municipalities are classified according to financial strength/ Annual Revenue Earning by the Ministry of Local Government, Rural Development & Co-operatives. The existing classification of all municipalities and their criteria are shown in Table 3.5. Kalaroa falls under 'B' Class Paurashava having revenue earning of Tk.2 million by the classification of the Ministry. The statement of Holding Tax Collection for the financial year 2010-2011 was Tk. 7685500.00. The total earning of the Paurashava for the fiscal year 2010-2011 is Tk. 10915500.00 and expenditure Tk. 10915500.00. The details are given in **Table 3.6**.

Table 6.5: **Hierarchy of Paurashavas (Municipalities)**

Category of Paurashavas (Municipalities)	Annual Revenue Earning
Class-A	6 million +
Class-B	2 million
Class-C	Less than 2 million

Source: LGD, 2005

Table 6.6: **Budget for the Financial Year 2010-2011**

Type of Earning	Total Amount (Taka)	Type of Expenditure	Total Amount (Taka)
Revenue Earning	7685500.00	Revenue Expenditure	6743600.00
Development Earning	3230000.00	Development Expenditure	4171900.00
Total	**10915500.00**	**Total**	**10915500.00**

Source: Kalaroa Paurashava, 2011

At present there are no Town Planning personnel in Kalaroa Paurashava. All town planning works have been performed by the Engineering Section headed by one Sub-Assistant Engineer. At least one Town Planner is required to perform the planning works as well as guide and control physical development of the Paurashava in a planned manner. However, the existing institutional capacity of the Paurashava should be enhanced.

3.7 Urban Growth Area

Kalaroa Thana was converted into an Upazila in 1983 from Thana and the Paurashava was established on 1990 as 'C' class Paurashava. Its present status is 'B' Class Paurashava. Since the inception of Paurashava people started to migrate from the neighboring Upazilas to Kalaroa Paurashava with a view to get better urban facilities.

From that time different Govt. offices have been established and at the same time business also have been expanded.

Physical growth has been taken place radially following the connecting transport networks. Till now as many as 12970 structures have been established. During delineation of Paurashava area and physical feature survey it is observed that, the physical growth is mainly proceeding Jessore-Satkhira Road. Besides, the gradual physical growth of Kalaroa Paurashava town also identified along all the transport routes.

Kalaroa Paurashava area and its boundary have clearly defined by the Government through gazette notification at the time of declaration of Paurashava. In the gazette notification of 1990 the covered area are shown by the full/part mouza maps together with individual plot numbers covering an area of 14.878 sq km or 3676.448 acres.

3.8 Catchment area

The favorable location has benefits Kalaroa in two ways: it allows people to come to Kalaroa to purchase goods and services, and it allows Kalaroa businesses, including wholesale businesses, to deliver goods and services to places outside the town. The Kalaroa Upazila HQ's provides govt. services for neighboring communities of the entire Upazila including the Paurashava area. Kalaroa has six colleges and ten high schools which draw students from the population in surrounding communities. The schools bring children and parents from surrounding villages and unions to Kalaroa for educational and co-curricular activities. In addition to offering educational and recreational services, the Paurashava has a number of retail stores including markets, clothing, gifts, furniture, drug stores, and general merchandise stores. The town has a number of restaurants. As well, there are professional medical services such as doctors, dentists, dispensing opticians, and veterinarians in the Upazila Health Complex, which attracts people from the surrounding areas of Kalaroa Paurashava. However, the influential area of Kalaroa Paurashava is delineated along the transport routes.

However, the catchment area of Kalaroa Paurashava is delineated along the transport routes such as Medical College Road, Sree Patipur Sarak to Jessore-Satkhira Road. Kalaroa Paurashava area and 3 (four) Union Parishads namely- Paurashava, Gopinathpur and Murarikati of Kalaroa Upazila fall under the catchment area of the town.

3.9 Land use and Urban Services

Kalaroa urban center and the peripheral and fringe areas of this urban center are in continuous process of changes. As such, the land use character of the area is expected to be of non-rural in nature and found to comprise activities commensurate with urban living. The spatial structure and land use pattern of the project area have been mostly the result of natural growth. Here although a development took place during the last decade yet the project area is still predominantly agricultural in character. Urban growth is found in mainly middle part of the project area along the both sides Jessore-Satkhira Road. Residential rural settlements are also found along the major roads and in almost scattered manner.

Agricultural Land Use

The major portion of land of the project area is under agricultural use. Around 2478.817

acres of land of the Paurashava is under agricultural use. It appears from field survey that Ward 7 has maximum agricultural land (770.32 acres), which is 31.08% of the total agricultural land of the Paurashava. These areas have distinct rural character.

Residential Land Use

Residential use includes residential house, residential quarters, rest house, slum, mess etc. It has been appeared that Ward 8 has the most residential concentration (14.56%) while; Ward 2 possesses the second position having 14.13% residential land. Ward 4 has the lowest residential concentration.

Commercial Land Use

Commercial land use mainly comprises of different types of shops (book shops, cloth shops, department stores, grocery shops, stationary shops etc.), market. Katcha bazaar and other lands being used for commercial purposes. Survey result depicts that commercial activities are mainly concentrated in Ward 2, which is 40.34% of the commercial uses of the entire Paurashava. Ward 3 has the second highest commercial uses of land (17.04%).

Water body

Water body of Kalaroa Paurashava mainly consists of ponds, ditches, khals, irrigation canals etc. It covers 383.44 acres of land. Ward 7 has the highest percentage (26.64%) of Water body in the Paurashava. Ward 1 has the minimum amount of water body comparing with other Wards of the Paurashava.

Circulation Network

Pucca road, Semi-pucca road, Katcha road and Rail line constitute this category of land use. Field survey reveals that highest percentage of circulation network land use is around 17.72% in Ward 6. Ward 2 has minimum amount (16.21%) of this kind of land use.

Education and Research Land Use

Land that is used for College, High School, Primary School, NGO School, Madrasha and other means of education and research are considered in this section. As survey result shows, this type of use is the maximum in Ward 2 (27.46%).

Industrial Land Use

Survey revealed that Ward 8 has the highest level of land uses (33.93%) for Industrial/Processing and Manufacturing purpose. This type of uses include rice mill, saw mill, ice factory, and seed processing industry, bakery factory and other manufacturing and processing activities. It is noticed that Ward 3 has no such type of land use.

Transportation Facilities

In this category bus-truck terminal/stand, ferry ghat, rickshaw garage, passenger shed, post office, rail station, telephone exchange, ticket counter etc. are considered. According to field survey there are 4.91 acres of land in Kalaroa Paurashava for this purpose.

Urban Green Space

Botanical garden, ecological park, graveyard, crematorium, historic sites etc. are included

in urban green space category. There is 4.416 acres land for this type of land services in this Paurashava.

3.10 Paurashava's Functional Linkage with the Regional and National Network

Regionally Kalaroa Paurashava is located in Satkhira district of Khulna Division. Kalaroa Paurashava is located at Southern part of Kalaroa Upazilla. Betraboti River bisects the Paurashava in the northern side. The Paurashava as well as the Upazilla is connected within the region by only road ways. The project area is one of the important centers of economic activities within the South-Western region.

Kalaroa Paurashava has long cultural and trading relation with Satkhira Sadar, Sharsha, Keshabpur and Jhikargachha. Moreover, these areas depend on each other for various raw materials and finished products. The long established easy transportation link has brought these areas closer in terms of trade and industrial activities. A map showing the linkage of Kalaroa Paurashava in the regional and national set up is shown in **Map 3.1** below.

Map 6.1: **Regional Connectivity Map of Kalaroa Paurashava**

3.11 Role of Agencies for Different Sectoral Activities

Local Government Engineering Department (LGED) is one of the largest public sector organizations in Bangladesh entrusted for planning and implementation of local level and small scale water resources infrastructure development programs. LGED works closely with the local stakeholders to ensure people's participation and bottom–up planning approach in all stages of project implementation cycle. LGED promotes labor-based technology to create employment opportunity at local level and uses local materials in construction and maintenance to optimize the project implementation cost with preserving the desired quality. LGED works in a wide range of diversified programs like construction of roads, bridges/ culverts and markets to social mobilization, empowerment and environmental protection.

Roads & Highways Department (RHD) is responsible for the construction, maintenance and management of the National, Regional and Zilla road network and some bridges under the Bangladesh Government. Presently Zilla road passing through the Paurashava area is executing by the RHD department.

Implementation of Flood Control and Drainage (FCD) program and Flood Control, Drainage and Irrigation (FCDI) program falls under the responsibility of Bangladesh Water Development Board (BWDB). BWDB is playing vital role in providing flood control, drainage and irrigation facilities through construction of embankment, irrigation canals, drainage channels, bridges, sluice, regulator and other water control structures in the Paurashava vicinity as well as other areas of the country.

In Paurashava areas the DPHE solely or jointly with the Paurashava is responsible for Water Supply & Sanitation services. In addition, DPHE is responsible for assisting the Paurashavas through infrastructure development and technical assistance. To strengthen water testing facilities through establishment of laboratories, carryout Hydro-geological investigations in search of safe source of water supply and promote social mobilization for awareness rising towards proper management of water supply & sanitation infrastructure and promotion of personal hygiene practices are also some of the major responsibilities of DPHE.

The Power Development Board (PDB) supplies electricity to Kalaroa from a substation located at Satkhira district. Both the PDB and Rural Electrification Board (REB) have the responsibility for distribution of electricity to Kalaroa Upazilla. Out of total connections within the Paurashava the PDB has connected about 80% and rest by REB.

Ministry of Health and Family Planning provide health facilities at the upazila level including Paurashava area through Upazila Health Complex. Ministry of education is responsible for construction of educational institutions at the upazila level. The Paurashava Authority has the responsibility to provide piped water supply, construct hats/bazaar, kitchen market, auditorium, community center, street lighting and other civic amenities. Among other sectoral agencies, Department of Agricultural Extension, Fisheries Department, Veterinary Department under Upazila Parishad and Zilla Parishad, PWD, NGO's are also involved in the provision of concerned services and facilities. The following Sectoral/Sub-Sectoral Agencies are involved in the development activities of Kalaroa Paurashava (**Table 3.7**)**.**

Table 6.7: **Sectoral/Sub-Sectoral Agencies of Kalaroa Paurashava**

Name of Agencies	Type of works done
Kalaroa Upazila Parishad (through PIO)	- Construction of Pucca, Semi-pucca and Katcha Roads - Pond Excavation - Construction of earthen Embankment
Roads & Highway Dept.	- Construction of Zilla Road
LGED	- Construction of Local Roads, drains
Dept. of Public Health Engineering (DPHE)	Provide low-cost water-sealed latrine Piped Water Supply Provide Tube Well (Tara pump) Simple Hand Tube Well
Zila Parishad	- Construction of Educational Building
Bangladesh Water Development Board	- Construction of Embankment with RCC blocks, construction of Bridges/ Culvert and water control structures
PDB/REB	- Supply of electricity
Ministry of Education	- Construction of Educational Institutions
Ministry of Health and Family Planning	- Providing health facilities
Public Works Department (PWD)	- Contraction and maintenance of public buildings

Chapter 4

Projection of Future Growth by 2031

4.1 Introduction

Kalaroa Paurashava is a predominantly residential town that has experienced moderate growth over the last decade. It is likely that these circumstances will substantially change over the next 20 years. However, a clear defined set of growth policies, comprehensive Master Plan and related regulations are needed to guide the Paurashava town in future development. The proposed Master Plan provides guidelines for the development of remaining vacant areas within the proposed areas within and beyond current gazetted Paurashava boundaries.

4.2 Projection of Population

The assumptions are based on past trends and the projections only indicate what may happen should recent trends continue. The trend-based assumptions remain valid. The mechanics of projecting population growth from base year data and assumed future trends of growth rate are straightforward. **Compound rate of growth method** is adopted in projecting the future population of any target year assuming a growth rate from past trends. In this method, following formula is used to compute the projected population.

$P_n = P_o (1+r/100)^n$

Where,

r = annual rate of growth

P_n = population in the target year

P_o = population in the base year

n = number of intermediary years

During the period 2001 to 2011, the population growth rate of Satkhira District was 1.19 in the urban area as against 0.62 in the entire district irrespective of urban and rural area. In the Kalaroa Upazila the growth rate was 0.71 and in Kalaroa Paurashava the growth rate was 1.19 during the same period. However a comparative growth rate at the regional and local level is presented in **Table 4.1**.

Table 8.1: **Comparative regional and local growth rates**

Administrative Unit		Growth Rate
Satkhira District	District	0.62
	Urban	1.19
Kalaroa Upazila	Upazila	0.71
	Paurashava	1.19

Source: BBS 2011

The Paurashava growth rate (1.19) is considered for future population projection. Following the above mentioned process, population of whole Paurashava at 5 years interval up to 2031 is presented in **Table 4.2** and **Figure 3.1**.

Table 8.2: Trend of Population Growth

Census Year	1981	1991	2001	2011
Total Population	13189	18346	24209	27250

Source: BBS 2001 & BBS 2011.

The Paurashava growth rate has been applied to estimate the projected population at 5 years interval up to 2031 and presented in **Table 4.3**.

Table 8.3: Projected Population of Kalaroa Paurashava

Year	Population
2011	27250
2016	28910
2021	30672
2026	32541
2031	34524

The population of each ward at Kalaroa Paurashava is estimated assuming 1.19 as annual growth rate. Details are provided in following **Table 4.4.**

Table 8.4: **Ward wise Projected Population of Kalaroa Paurashava**

Ward	Population				
	2011	2016	2021	2026	2031
Ward No.01	3222	3418	3627	3848	4082
Ward No.02	3910	4148	4401	4669	4954
Ward No.03	3916	4155	4408	4676	4961
Ward No.04	1795	1904	2020	2144	2274
Ward No.05	2844	3017	3201	3396	3603
Ward No.06	3149	3341	3544	3760	3990
Ward No.07	3249	3447	3657	3880	4116
Ward No.08	2934	3113	3302	3504	3717
Ward No.09	2231	2367	2511	2664	2827
Total	**27250**	**28910**	**30672**	**32541**	**34524**

4.3 Identification of future economic opportunities

The prospect of Economic Activities related to availability of manpower, their level of education, their income level, transport network, marketing facilities, power supply and Government policy.

In Kalaroa the availability of manpower is sufficient. There are 64.80 percent population of the Paurashava within age group 15-59 years, 19.75 percent are above SSC level educated and 15.4 percent people's monthly income are above Tk. 15000/=.. Kalaroa Paurashava is well connected with the neighboring district headquarters namely-Jessore and Satkhira. Its functional geographic location in the regional and national transport network is an important factor in raising the opportunities for trade and commerce.

4.4 Projection of land use

The main basis of the projection of future land uses is the projected population and the planning standard (approved by the LGED).

Since the land use categories of survey data (i.e., 19 items) and the land use categories

as per approved planning standard (i.e., 13 items) are not similar, it was not possible to derive the projected land use from the extrapolation of land use categories provided in the survey data. The requirement of land was calculated based on the given standard and the projected population for the year 2031 which was presented in **Table 4.5.**

Table 8.5: **Projected Landuse of Kalaroa Paurashava at 10 years interval up to Year 2031**

Facilities	Standard (LGED)	Existing Land of 2011 (acres)	Land Requirement for 2021 (acres)	Additional Requirement for 2021	Land Requirement for 2031 (acres)	Additional Requirement for 2031
Residential						
General Residential	1.00 acre/ 100 pop.	592.21	306.72	-	345.24	-
Administration						
Upazila Complex	15 acres/ Upazila HQ	11.11	15.00	3.89	15.00	3.89
Paurashava Office	3 acres/ Upazila HQ	0.29	3.00	2.71	3.00	2.71
Commerce						
Wholesale Market	1.00 acre/ 10000 pop.	0.00	3.07	3.07	3.45	3.45
Retail sale Market	1.00 acre/1000 pop.	22.94	30.67	7.73	34.52	11.58
Neighborhood Market	1.00 acre/ Neighborhood market	0.00	4.00	4.00	4.00	4.00
Super Market	1.50 acres/ super market	0.00	1.50	1.50	1.50	1.50
Industry	1.50 acres/ 1000 pop.	10.59	46.01	35.42	51.79	41.19
Education						
Primary School	2.00 acres/ 5000 pop.	5.63	12.27	6.64	13.81	8.18
Secondary School	5.00 acres/ 20000 pop.	8.35	7.67	-	8.63	0.28
College	10.00 acres/ 20000 pop.	9.10	15.34	6.24	17.26	8.16
Vocational Institute	5.00 acres/upazila	0.69	5.00	4.31	5.00	4.31
Others (Madrasa)	5.00 acres/ 20000 pop.	2.20	7.67	5.47	8.63	6.43
Health Facilities						
Upazila Health Complex/ Hospital	10 acres/ Upazila HQ	6.04	10.00	3.96	10.00	3.96
Health Center/ Maternity Clinic	1.00 acre/ 5000 pop.	1.38	6.13	4.76	6.90	5.53
Open Space/ Recreation						
Playground	3.00 acres/ 20000 pop.	0.25	4.60	4.35	5.18	4.93
Park/ Open space	1.00 acre/ 1000 pop.	0.33	30.67	30.35	34.52	34.20
Neighborhood Park	1.00 acre/ 1000 pop.	0.00	30.67	30.67	34.52	34.52
Stadium	7 acres/upazila HQ	0.00	7.00	7.00	7.00	7.00
Cinema	0.5 acre/ 20000 pop.	0.48	0.77	0.29	0.86	0.39

Facilities	Standard (LGED)	Existing Land of 2011 (acres)	Land Requirement for 2021 (acres)	Additional Requirement for 2021	Land Requirement for 2031 (acres)	Additional Requirement for 2031
Community Facilities						
Mosque/ Temple/ Church	0.50 acre/ 20000 pop.	6.38	0.77	-	0.86	-
Eidgah	0.50 acre/ 20000 pop.	0.72	0.77	0.05	0.86	0.15
Graveyard	1.00 acre/ 20000 pop.	3.60	1.53	-	1.73	-
Community Center	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Police Station	3 acres/ Upazila HQ	2.01	3.00	0.99	3.00	0.99
Fire Service Station	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Post Office	0.50 acre/ 20000 pop.	0.13	0.77	0.64	0.86	0.73
Utility Services						
Telephone/ Telegraph Exchange	0.50 acre/ 20000 pop.	0.82	0.77	-	0.86	0.04
Electric sub-station	1.00 acre/ 20000 pop.	1.88	1.53	-	1.73	-
Water Supply	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Gas	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Garbage Disposal	5.00 acre/ upazila	0.00	10.00	10.00	10.00	10.00
Waste Transfer Station	0.25 acre/waste transfer Station	0.00	0.75	0.75	0.75	0.75
Transportation Services						
Bus Terminal	1.00 acre/ 20000 pop.	2.63	1.53	-	1.73	-
Truck Terminal	0.50 acre/ 20000 pop.	0.00	0.77	0.77	0.86	0.86
Tempu Stand	0.25 acre/ 20000 pop.	0.00	0.75	0.75	0.75	0.75
Rickshaw Stand	0.25 acre/ 20000 pop.	0.00	0.38	0.38	0.43	0.43
Roads	15% of the built-up land	61.67	113.64	51.97	113.64	51.97
Urban Deferred	10% of the total built-up area	0.00	75.76	75.76	75.76	75.76

Chapter 5

Development Problems of the Paurashava

The towns and cities of Bangladesh have been developed without following any proper planning process and standards. The Paurashavas are evolved as administrative centers for performing functions of the administrative units (e.g. Upazila, Zilla). Kalaroa Paurashava is not an exception of that. As a result, some development problems are identified during conducting survey and field visits.

5.1 Physical Infrastructure

In Kalaroa Paurashava town, the buildings have been constructed in haphazard manner without following any planning standard which raises some development problems, such as narrow roads leaving no provision for expansion in future, lack of space for construction of drains, footpaths and utility lines. In case of any emergency such as fire or death, fire fighting vehicle/ambulance face difficulties to reach the destination.

There are one river e.g. Betraboti River and few small canals are located within the Paurashava area and 1019 ponds and ditches. These khals and ponds create some problem while construction of transport network, drain, pipeline, gas line etc.

There is very little roadside drain in Kalaroa. Moreover, if any, the roadside drains are inadequate and incapable of draining out the storm runoff generated in the catchment area due to insufficient capacities, incorrect gradients and improper outfall. Most of the existing drains, as identified from field visit, remain inoperative due to blockage from disposal of solid waste into the drains.

During conducting the Physical Feature Survey it has been recorded that total un-planned, haphazard, incompatible land uses has been developed in Kalaroa Paurashava. This sort of land use development also create problem.

Transport problem of Kalaroa Paurashava has been continuously rising as the development and management of road network has not been commensurating with the increasing demand for its usage. Traffic congestion, accidents, pedestrian and parking difficulties, air and noise pollution are the traffic and transportation problem of Kalaroa Paurashava. If this unplanned construction goes on unabated, it will make the environment of Kalaroa Paurashava unsuitable and inhabitable.

5.2 Socio-Economic

Development Problems of Kalaroa Paurashava with regards to socio-economic were mainly the education level, marital status, migration, occupation/employment and income-expenditure.

From the socio-economic study it has been revealed that, out of total population 11.91 percent never attended school for more than one reason.

Regarding occupation/ employment it has been observed that, young people are not

getting job in the local level. The case of women's employment is not satisfactory.

Lastly, the income level of general people of Kalaroa Paurashava is less but expenditure is comparatively high. So it is difficult on the part of the habitant to make any surplus.

5.3 Environmental

The problems concerning environmental issues of Kalaroa Paurashava are stated below:

In Kalaroa Paurashava with the increased population, generation of solid waste per person per day also is increasing. Lack of proper solid waste management system has been polluting the ambient air and surface water.

Improper solid waste disposal, lack of sanitation system and untreated sewage mixes with the water may deteriorate both surface and ground water quality. Water pollution problem often is compounded by the low flow situation in dry season.

Air pollution may be another problem of Kalaroa Paurashava. The main sources of air pollution are emission of harmful gaseous matters from vehicle, industrial sectors, and construction and open dumping of Garbage.

In Kalaroa Paurashava a gradual process of increase different types of land uses including road and other infrastructures are going on. All these activities will reduce agricultural land, water bodies and other natural resources.

Chapter 6

Review of Policies, laws and Regulations

6.1 Indicative prescription of policy for Paurashava in the light of different urban policies, laws, regulations and guidelines

The policies, laws and regulations relevant to urban development and implementation of the plan is thoroughly reviewed which is summarized in the following **Table 6.1**.

Table 13.1: **Review of Policies/laws/Regulations**

Sl. No.	Policies/Laws/ regulations	Application	Implementation Agencies
01	Local Government (Paurashava) Act, 2009	Guide for the growth, development, and control of the different functions of Paurashava	The Paurashava Authority
02	National Land use Policy, 2001	Integrated planning and management of land resources	Ministry of Land
03	National Housing Policy (1993)	Physical Planning, Water Supply and Housing Sector	UDD, National Housing Authority, Ministry of Housing and Public Works
04	National Land Transport Policy (2004)	Provision of safe and dependable transport services, and improving the regulatory and legal framework	BRTA, BRTC, Ministry of Communication
05	The Environment Policy, 1992	To ensure environmentally sound development in all sectors	Ministry of Environment and Forestry
06	The Environment Conservation Rules,1997	Application relating to pollution control through issuance of Environment Clearance Certificate	Department of Environment
07	Disaster Management and Climate change Policy	Improve disaster awareness and develop disaster management plans	Ministry of Disaster Management and Relief
08	Bangladesh National Tourism Policy	To preserve, protect, develop and maintain tourism resources	Ministry of Civil Aviation and Tourism, Bangladesh Parjatan Corporation
09	Agriculture Policy	To ensure planned utilization of land	Ministry of Agriculture, Department of Agricultural Extension
10	National Forest Policy (1994)	Protection and management of resources (natural forests, protected areas, and plantations)	Ministry of Environment and Forestry, Bangladesh forest Department
11	Population Policy, 2004	Urban growth and development, Urban Migration and Planned Urbanization	Ministry of Health and Family Welfare
12	Canal and Drainage Act, 1873 (Act No. VIII of *1873)*	Preserve Natural Drainage Network through man-made canal linking with others and River	BWDB, LGED
13	The Motor Vehicles Ordinance, 1983	Control and scrutinize the movement pattern of motorized traffic	BRTA, Paurashava Authority

Sl. No.	Policies/Laws/ regulations	Application	Implementation Agencies
14	The Motor vehicle rules, 1997	Design and specification of the length and height of motorized vehicles and repair of break down vehicles	BRTA, Paurashava Authority
15	National Water Policy, 1999	Policy direction for water sector and Implementation of the Drainage and Flood Plan	BWDB, LGED, Paurashava Authority
16	Industrial Policy, 2005	Setting up planned industries and discouraging unplanned industries in the light of past experience	Paurashava Authority, BSCIC, Ministry of Industry

6.2 Laws and Regulations Related to

6.2.1 Urban Development Control

The physical growth and development of Kalaroa Paurashava Town is subject to controlled mainly by the Local Government (Paurashava) Act, 2009 & Building Construction Act-1952 and 2004. But a very weak Development Control system has been implemented in Kalaroa Paurashava. So it's spatial land use pattern has been become the haphazard, incompatible and therefore, inefficient and un-healthy.

In the past without the presence of full guideline all the development has taken place as a peach meal as per the requirement of locality/ people so a total network could not be developed. Existing road network, drain, residential houses, commercial units, industrial units etc. all are the example of such spontaneous development.

6.2.2 Paurashava Development Management

Whatever may be contained in the relevant ordinance/act but in practice that are not properly implemented? This is due to mainly shortage of technical man power. As per Govt. allocated organogram there should be 27 employees in Engineering Section, 26 employees in Administration Section and 22 employees in Health Section. But in practice there are only 5 employees in Engineering Section, 9 employees in Administration Section and 1 employee in Health, Family Planning and Conservation Section are presently employed in Kalaroa Paurashava. Besides, there are other reasons also which are out of development management.

Chapter 7

Critical Planning Issues

7.1 Transport

In Kalaroa the existing traffic and transportation infrastructures are confined mainly with the existing road network. The project area is served by 91.30 kilometers of roads. Total area covered by road network is about 61.64 acres. Out of the total length of roads only 9.17 km are pucca, 42.57 km are semi-pucca and 39.56 km are Katcha.

It is very critical to by-pass the inter-upazila and inter-district traffic movement without interrupting the living environment and intra-movement pattern of the inhabitants. All the through traffics are observed to ply over the bazaar area in the central part of the Paurashava.

Commercial development occurs only in the Middle-Eastern part of the Paurashava. As a result, the Paurashava dwellers have to travel a long distance to buy their daily necessities which raises traffic congestion in the bazaar area and increases the travel time. The bazaar area is the most congested areas in Kalaroa Paurashava. The Bazaar area of Jessore-Satkhira Road can be considered as congested areas.

There is a bus terminal, bt no truck/tempo stand or terminal provided with facilities for loading-unloading and passenger-shed. All the vehicles stop on the roadside generating congestion and inconvenience to both the commuters and pedestrians.

Traffic generation centers at Kalaroa Paurashava are very limited. The Upazila complex and Bazar are the main Traffic generation center. Besides, different governmental offices, cinema hall, shopping centers, educational institutions, Bus Stand, Upazila Complex, Police Station, Different Educational Institutions, Different Markets, Kutcha Bazars, Hospitals, Land Office, different Govt. Offices etc. are also contributing in traffic generation.

Among all the modes the road transport is only available in Kalaroa Paurashava. The transportation services are also very limited in Kalaroa Paurashava. There are services both for the passengers and goods. Bus, Auto Rickshaw/Tempo, Bhodvodi, Rickshaw, Rickshaw-van, Push cart and Bi-cycle offering services for the people and Truck, rickshaw van and push cart for different goods.

There is no designated place for parking the vehicles in Kalaroa Paurashava. Unfortunately there is no footpath besides any roads of the Kalaroa Paurashava.

Traffic management system of Kalaroa Paurashava is unorganized, backdated and poor. There is no either any traffic police or computerized signal system to manage and control the traffic. There is no lane marking and footpaths of roads. In case of any emergency or any accident the local Thana tackle the problem.

7.2 Environment

The urban environment of the Kalaroa Paurashava includes both built and natural

environment. Built environment includes waste management, water, air quality, energy usage, transport network, slum improvement, and disaster mitigation. The urbanization where the built environment overburdens the natural environment cannot be sustainable. But urbanization is inevitable for countries economic growth.

The Paurashava has the thinking that operation of deep tubewells will not be cost effective as arsenic and iron free drinking water is available in almost all hand tubewells throughout the Paurashava round the year. The water table within Paurashava ranges from 10 ft to 15 ft and is lower during winter. There is no difficulty of getting drinking water in summer season from hand tube wells. The water supply within the Paurashava is mainly by hand tube wells owned by house owners. The DPHE and CARE are working with other NGOs for investigating drinking water quality.

Another critical environmental issue that can be considered in the planning process of Kalaroa Paurashava is the use of chemical fertilizers and synthetic pesticides which remain persistent for a longer term. This is a serious threat to the fertility of soil leading to subsequent pollution of water after wash out through rainfall. As a result of over-utilization of these chemical fertilizer and synthetic pesticides, living of all habitats will be in serious threat that may cause the ecological imbalance and loss of biodiversity.

7.3 Land Use Control

The spatial structure and land use pattern of Kalaroa Paurashava have been mostly the result of natural growth. Urban growth is found in mainly middle portion of Paurashava both the side of Jessore-Satkhira Road. The agricultural land use covers the major part (67.37 percent) of the Paurashava area. The roads inside the project area are quite narrow. The shops and different commercial establishments have followed along internal roads. Residential development occurs mainly as Ribbon Development along the existing roads. Scattered settlement pattern has been evolved in the Paurashava area since establishment of Kalaroa Upazila Headquarters. As a result, vast agricultural land has been exploited through low density scattered settlement. Thus it is very difficult to take any irrigation scheme in the agricultural land and if possible the command area is less compared to a single agricultural zone. On the other hand provision of supplying any utility services in the scattered settlement is not cost effective. In this point of view land use control is a critical issue that should be considered carefully in the formulation of land use plan and zoning.

7.4 Disaster

Kalaroa is not susceptible to any kind of major disaster like flood, cyclone, earthquake, Nor'westers and tornado, landslide, erosion, drought etc. Some natural hazards and calamities like flood, tornado and drought cause loss of property, livestock and agricultural production in almost every year imposing an impact on human life.

Kalaroa falls under the tornado-free districts of the West-central regions in Bangladesh. Thus it is not a critical issue in the planning process.

Drought causes the depletion of ground water and soil moisture and hence damage of crops which is visible in the Northern Region of Bangladesh. Mainly agricultural drought is observed in some years which aggravate the yield of the main crops affecting food

security.

Kalaroa located in the South-Western part of Bangladesh is the lowest active seismic zone and had experienced earthquakes of low intensity in the past. This critical issue should be considered in the planning process especially during the plan permit process regarding construction of houses, buildings, other structures and infrastructures to be built earthquake-resistant at the maximum recorded level.

The most critical issue regarding natural hazards and disaster is the flood hazard. Kalaroa is not affected by annual flood.

7.5 Laws and Regulations

There is no provision in the Industrial Policy, 2005 regarding setting up of industrial estate or special economic zones to reduce environment pollution and make service provision easier. Thus it is a critical planning issue pertinent to the regulations of industrial establishment.

National Environmental Policy 1992 does not provide guidelines for controlling of pollution in all kinds of water bodies by municipal, industrial waste and toxic materials and shifting of industries from residential areas. This point is a critical issue that should be considered in the planning process of environmental management.

Vast agricultural land was incorporated in the urban area during declaration of the Paurashava without considering fertility or agricultural productivity and requirement of land for providing urban services and land uses. According to Agricultural Policy 1999, acquisition of land in excess of requirement for non-agricultural purposes will be discouraged. Thus implementation of development proposals in the light of Local Government (Paurashava) Act, 2009 will conflict with the Agricultural Policy 1999.

The Government of Bangladesh formulated the first ever housing policy of the country in 1993. Despite formulation of National Housing Policy 1993, no effective program and projects have been undertaken. National Housing Authority has been formed but it is yet to draw up any workable program to realize national housing policy.

The policies, laws, by-laws, acts and regulations relevant to the implementation of the Structure plan of Kalaroa Paurashava are executed, exercised and implemented by different departments, ministries and authorities. There is no coordination among these departments, ministries and authorities regarding inter-related policies, laws and regulations. This is the most critical issue to be considered in formulation of the Structure Plan.

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Chapter 8

Landuse Development Strategies

8.1 Broad View of the Plan

Kalaroa Paurashava is predominantly an Upazila headquarters town with emphasizing administrative functions facilitated with limited support services and agro-based small trade center meeting the community needs from the inhabitants of the Upazila jurisdiction area. Thus the Paurashava should be developed with necessary infrastructures and ancillary facilities along with provisions for planned growth of the town.

The Structure Plan sets forth certain strategies and policies for managing growth of the town, which is anticipated to encourage the planned growth and control any unplanned growth within the Paurashava area. Strategies for land use development is formulated in such way that conform the regulations associated to the optimum use of land, ensure a sound traffic movement system and promote a livable environment. The plan also indicates certain polices for promoting the economic growth, employment opportunities for the Paurashava dwellers and upgrading the living standards of the inhabitants as a whole.

8.2 Strategies for optimum use of Urban Land Resource

The Structure Plan aims to ensure optimum use of urban land resources in the long term. The demands of almost most of the population growth within the Paurashava area other than the migrated population will be met by densification of the existing residential land in the core area. The migrated population will be accommodated in the peripheral area provided with infrastructures and necessary services. However the optimization strategies for urban land resources can be summarized fewer than two broad sub-strategies.

a) Consolidation of the Core Area

Kalaroa Paurashava was established in 1990. Kalaroa came into existence in 1851 as Thana, and upgraded to upazila in 1983. After the establishment of upazila headquarters the vast majority of population growth occurred within the core area. This phenomenon was the result of several factors. The most dominant factor was development of infrastructures, transport and communication facilities and utility services for functioning activities of Upazila Parishad. Further population growth occurred in this area after the declaration of Paurashava in 1990 due to availability of urban services and buildable land at affordable price adjoining the Upazila Headquarters.

This sub-strategy calls for further consolidation of the existing core area in the short to medium term to optimize existing urban land resources with priority given to serviced low-density areas, vacant and under-utilized land. Policies regarding this sub-strategy are detailed in the Urban Area Plan (Land Use Plan).

a. **Accelerated Development in the Peripheral Area**

The area beyond the core area where a slow trend of urbanization is continuing in unplanned manner falls under this sub-strategy. Scattered settlements along the transport

network approaching the upazila headquarters have been evolved in a radial pattern. This type of settlement in the peripheral area may also be termed as ribbon development.

This sub-strategy involves adoption of policies aimed at accelerating development in the medium to long term through provision of necessary primary infrastructures in a planned way. The areas under this sub-strategy are expected to absorb by most of the migrated population from rural areas of Kalaroa Upazila and other areas beyond the Paurashava. Priority will be accorded to part of Jhikra, Gopinathpur and Morarikathi mouza area where potential areas for accelerating development is available and provision of necessary services will be to some extent cost effective. The areas to be impacted by this strategy have been shown in **Map 8.1** (Structure Plan Map) and the policy options have been entailed in the Urban Area Plan.

Strategies shall also be implemented to consolidate the development, enhance the environment of stable areas and enhance the working, living and business environment of the core area. Areas for policy zoning were determined based on considering the existing trend of growth and optimization strategy which is shown in **Map 8.1** and in **Table-8.1** below.

Table 17.1: **Policy Zoning Areas of Structure Plan**

Policy Zones	Remarks	Areas (acres)	Percentage (%)
Agriculture Area	Agricultural land denotes the land suitable for agricultural production, both crops and livestock. It is one of the main resources in agriculture.	2189.296	59.55
Core Area	This area is also known as built-up area. This is defined as the area which has the highest concentration of services; it also has the highest population concentration and density. It will absorb most population growth during the Landuse Plan (2011-2031) period.	318.600	8.67
Fringe Area	This zone is developing areas which will take further decades to reach the population densities of the urban core area. Low initial densities in these areas do not justify supply of a full range of services as they will initially be underused. However, it is essential that planning and reservation of rights of way, at least for primary networks, beundertaken soon to enable provision when justified by increased density levels and allowed by resources.	0.000	0.00
Major Circulation	Major circulation contains major road network and railways linkage with regional and national settings.	296.365	8.05
New Urban Area	This zone will be the required additional area for future planned urban development as per population projection. Existing physical trend of growth and potential areas shall have to be considered in demarking for new urban land development.	112.002	3.05
Peripheral Area	This is the zone where a slow trend of urbanization is continuing in unplanned manner. The area identified in the Structure Plan as the likely choice for new urban development beyond the core area.	435.517	11.85
Water Body	Waterbody containing an area equals to or more than 0.15 acres excluding those of khal, irrigation canal and river will be treated as this category.	325.248	8.85
Total		**3676.448**	**100.00**

Map 17.1: Structure Plan of Kalaroa Paurashava

8.3 Plans for New Area Development

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 underused even lay idle for a long period. Additionally, the development is often very scattered, making provision of adequate services even more difficult.

Strategy

The Promoting Development Strategy for this urban sub area is to adopt policies which will accelerate development at the potential areas commensurating the existing physical trend of growth. This will release the population pressure from the core area, accommodate population growth in the long term up to the 2031 and ensure planned development. The purpose of this policy is to optimize the utilization of these extensive, but scattered and underutilized lands, at the same time promoting further outward, planned urban growth. The areas selected under this strategy are part of part of Gopinathpur, Morarikathi and Tulshidanga mouza. Details are shown in **Map 8.1**.

Policy NAD/01- New Area Development

To promote land subdivision of the selected area and provide necessary infrastructure and services in a planned way.

Implementing Agency: Kalaroa Paurashava, LGED, PDB, REB, DPHE, NGOs

Justification

Fringe areas under slow development offer excellent opportunity for planned development by means of land subdivision and infrastructure development.

Means of Implementation

Land acquisition should be done through the initiative of Paurashava Authority, then land preparation, land subdivision, earthwork will be furnished. New facilities and services like road, drains, footpath, waste transfer station and other civic services will be provided by involving the concerned agencies. Involvement of public sector along with private sector and NGO's or PPP (Public Private Partnership) may be an innovative concept for financing in this respect.

8.4 Areas for Conservation and Protection

Historic preservation is an endeavor that seeks to preserve, conserve and protect buildings, objects, landscapes or other artifacts of historical significance. In Kalaroa there are very minor things to be count under conservation and protection. However, the heritage sites of any archaeological and historical importance should be preserved and conserved following the proper planning procedure. The natural landscape including river, khal, lake, large ponds should be protected from encroachment, misuse or any other human intervention. The productive agricultural land should also be protected from converting it into unproductive urban land. The relevant policies regarding the conservation and protection of these sites are formulated as follows.

Policy CP/01- Preserve and conserve the heritage sites

To preserve the heritage sites in the Paurashava area without any change and conserve with controlled modifications and alterations.

Implementing Agency: Paurashava, Department of Archeology, Bangladesh Parjatan Corporation

Policy CP/02- Protect the Natural Landscape

The ponds with area more than 0.15 acres, lakes, canals, river, beels must be protected as water body from encroachment and conversion into other use. The permission for filling up of these ponds should not be given without any special case. These water bodies should be protected for the purpose of using them as retention pond and drainage channel.

Implementing Agency: Paurashava, LGED, BWDB

Policy CP/03- Protect the Productive Agricultural Land

The high value agricultural land should be protected from conversion into inefficient and unproductive urban land. These areas will be conserved and promoted as areas of high intensity food production in order to ensure urban food security in close proximity to the town and improve the income level within agricultural sector of the Paurashava' s economy.

Implementing Agency: Paurashava, DoE, Department of Agricultural Extension

Chapter 9

Strategies and Policies for Sectoral Development of the Paurashava

9.1 Socio-economic Sectors

9.1.1 Population

Controlling population should be given utmost importance nationally, as because of the uninterrupted population growth, the country's economic problems are being accentuated, pressing on its resources. It makes poverty reduction difficult which is the key to overall national development. So it is necessary to enhance population control drive. Grassroots level workers can play very effective role in this regard. An efficient, well- trained and well paid grassroots level work force can help profoundly in achieving the targets of population control policy of the government. Side by side promotion of education can be very effective in creation of awareness about small family size.

The existing (2011) and projected (2031) population of Kalaroa Paurashava are 27250 and 34524 respectively. The working population is considered as the population of 15-59 years of age. The number of population able to work at present is 17658 and this figure is anticipated to rise at 22371up to year 2031. 8.14% of the present workforce is currently employed in various economic sectors. If the current trend continues, 91.86% of the total projected workforce that is 20552 more employment should be provided for complete eradication of unemployment problem from the Paurashava. The following table shows detail in this regard.

Table 19.1: **Projection of Workforce**

Category	Existing (2011)	Projected (2031)	Employed Population		Employment Required	
			No.	% Workforce	No.	% Workforce
Total Population	27250	34524	1819	8.14	20552	91.86
Workforce (15-59)	17658	22371				

The existing gross population density of Kalaroa Paurashava is 7 persons per acre and it is expected that if the plan is implemented properly the density will rise at 9 persons per acre at the end of the plan period (Year 2031).

Strategy-1:

- Raise the education level among mass people and emphasize more on grassroots level family planning workers services with effective delivery of birth control services.

Policy:

Item	Executing Agency
Popu/1: Declare population as one of the most critical sectors of national development	Ministry of Planning, Ministry of Health and Family Planning
Justification: Per capital national growth is being eaten up by constantly growing population. By controlling population national benefits earned from economic growth can be shared in a better way, raising the living standard of the people.	
Popu/2: Put more efforts and resources in raising the level of education.	Ministry of Planning, Ministry of Health and Family Planning Ministry of Education.
Justification: Education would not only create awareness among the masses about the benefits of small family size, it will also help secure better job with pay that would reduce poverty, which is a major source of large family.	
Popu/3: Create well-paid and well-trained grassroot level family planning workers for motivational work.	Ministry of Planning, Ministry of Health and Family Planning,
Justification: Grassroots level workers can give door to door motivational services and distribute birth control materials in a better way. To get good services they must be well paid and efficient.	

Strategy-2:

- Ensure rational distribution of population all over the planning area to control and regulate population growth and density.

Policy:

Item	Executing Agency
Popu/4: Encourage people, especially the migrated people, through arrangement of awareness building program to settle them in the peripheral and fringe area	✓Ministry of Planning, ✓Ministry of Health and Family Planning ✓Kalaroa Paurashava
Popu/5: Provide urban services to the peripheral area to enhance settlement in this area	✓Kalaroa Paurashava

9.1.2 Economic Development and Employment Generation

Economic development of any place is associated with generation of employment. And generation of employment depends on the rate of investment in various sectors of an economy. An urban economy of any town starts building up with investment in the basic sector that leads to the building up of the non-basic sector. Investment in basic sector is not very bright in Kalaroa as it is a very small town with a very low level of population. Besides, it has to compete with other adjoining urban centers like, Sharsha, Jhikargachha and larger towns like Satkhira and Jessore. These urban centers are counter magnets of investment.

Strategy:

- Creating basic sector investment climate and lead the local economy forward through promotion of Small and medium Enterprise (SME).

Policy:

Item	Executing Agency
Econ/1: Provide bank loans on easy terms to attract prospective investors in the SME sector.	✓ Ministry of Industries ✓ Ministry of Commerce
Justification: Easy loans would Encourage and attract prospective investors for investment in small scale industries.	
Popu/2: Take measures to channelize remittance to value adding productive sectors.	✓ Ministry of Industries ✓ Ministry of Commerce
Justification: Larger amount of Remittance is being diverted to land purchase, which is considered as the safest investment. This huge capital may be channelized to productive sectors to help create more employment.	
Popu/3: Arrange entrepreneurship training programs for prospective investors.	✓ Ministry of Industries ✓ Ministry of Commerce
Justification: There are many potential investors who are ignorant of the ways and means of investment and. Operating an enterprise The training can help them get educated in these lines.	

9.1.3 Housing and Slum Improvement

As the town has low level of population, housing is yet to become a problem here. Housing policy and programs are provided and executed by the national government. There is no local office of the National Housing Authority to execute housing programs at Upazila level. As a local government, Paurashava can facilitate housing area development by means of providing road infrastructure, drainage, water supply, etc. in designated housing zones. The consultant supports the prevailing national housing policy and advocates its execution at all levels, which is highly lacking. The projection of housing unit is shown in **Table-9.2**.

Table 19.2: **Projection of Housing**

Category	Base Year (2011)	Projected (2031)
No. of Population	27250	34524
No. of Families	6570	8324
Housing Demand	1754	

It is observed that 1754 no's of housing unit is required for accommodation of the anticipated growth of population.

No slums are observed in this small town, the way they are exposed in large cities. Therefore, no slum and squatter related problems are there in the town.

Strategy:

- Upholding the role of Paurashava, as a facilitator to provide all necessary infrastructure and services to enable housing by people in general. As a least cost approach, involvement of the landowners in housing area development on public-private partnership basis will be encouraged.

Policy:

Item	Executing Agency
Policy House/1: Provide all necessary services and facilities to promote housing at private sector.	✓ Ministry of LGRD ✓ Kalaroa Paurashava
Justification: It is more difficult to provide housing on public sector initiatives as it involves funding, land acquisition, takes long time. By providing infrastructure and services, general people can be enabled to build their own houses.	
Policy House/2: The land owners of housing area can be involved in a participatory development technique where Paurashava will provide infrastructure and the cost will be shared by land owners.	✓ Ministry of LGRD ✓ Kalaroa Paurashava

9.1.4 Social Amenities and Community Facilities

Social amenities and community facilities include, education facilities, health facilities, open space recreation facilities, like, park and play ground, amusement park, community center. For comfortable and healthy urban living these facilities are the fundamentals. Since these are social services, they must be provided by the public sector agencies as public goods. For education and health facilities national government has policies and there are separate ministries and their agencies to execute the policies through programs and projects. There are also upazila level offices of the concerned agencies to take care of the national education and health policies and programs execution. For providing amenities like, park and play ground, community center the responsibility lies with the Paurashava.

For park and playground the Paurashava may secure local khas land. The open space recreation is difficult to provide as population expands and land price goes higher. Once time is lost vacant lands are also lost. Amid soaring land price and absence of vacant land, it becomes extremely difficult to provide open space recreation. So, it is better to secure vacant lands for open space before density of population increases and land becomes scarce. For community center intensive use of land should be made by making multiple use of same space. For example, providing community center, ward commissioner's office, clinic or any other use in the same building.

Strategy:

- Exploring khas/ public land within Paurashava and catching the unused/ vacant land for providing amenities before density of population increases and land becomes scarce and dear.

Policy:

Item	Executing Agency
Policy-Amenity/1: Procurement of khas and other public land for park, playfield, community center.	✓ Ministry of LGRD ✓ Kalaroa Paurashava
Justification: Since above facilities are non-revenue earning, they should be procured at least cost.	
Policy-Amenity/2: Procure land for open space facilities as quick as possible, because when land value will be higher cost of providing the facilities will also be very high. Besides, with the growth of population vacant land will disappear gradually, so no land will be available at strategic locations for providing open space facilities.	✓ Ministry of LGRD ✓ Kalaroa Paurashava

9.1.5 Tourism and Recreational Facilities

Kalaroa Paurashava is lagging behind the sites of historical importance or recreational facilities to attract the tourists from different places of Kalaroa Upazila and the surrounding areas. However the suitable location of the Paurashava in regional transport network connecting only the Satkhira district headquarter make it important to attract tourists from the neighboring and outlying areas. Following strategy and the relevant policies may be taken for improvement of tourism sector and providing recreational facilities in the Kalaroa town.

Strategy:

- Enhance the tourism and recreational facilities through provision of hotel/motel facilities, improvement of transport and communication facilities, ensuring public safety and security, establishment of tourism center equipped and provided with trained work force and development of new tourist/picnic spot.

Policy:

Item	Executing Agency
Policy-Tourism/1: Improvement of road network and introduction of comfortable and convenient bus service.	✓ RHD, LGED, BRTC ✓ Kalaroa Paurashava
Justification: This will encourage and attract the tourists to come into the Paurashava and thereby visit the important sites in and around the Paurashava	
Policy-Tourism/2: Setting up and develop tourist resort provided with proper landscaping and recreational facilities, rest house, hotels and motels	✓ Bangladesh Parjatan Corporation ✓ Kalaroa Paurashava
Justification: It will create interest in tourism among the people	
Policy-Tourism/3: Ensuring security of both life and assets of the tourists	✓ Kalaroa Thana ✓ Kalaroa Paurashava
Justification: The tourists will be assured of their life and belongings in visiting to the Paurashava area	

9.1.6 Safety and Security

Safety and security is a fundamental right of all citizens of Bangladesh as per provision of the constitution. Bangladesh Government has the responsibility to ensure safety and security to all the citizens. However, having conformed to the constitutional provision there

may be certain strategy and policy prescription in the structure plan to ensure safety and security to the Paurashava dwellers.

Strategy:

- Ensure public safety and security from fire, accident, hijacking and other threats through prevention and rehabilitation measures.

Policy:

Item	Executing Agency
Policy-Safety & and Security/1: Expansion of the existing fire station or construction of a new, larger facility to replace the existing one. If the existing fire station is not enlarged, it would be prudent to find a central location for the new fire station, so that it will be possible to provide a rapid response to incidents.	✓ Department of fire service and civil defense ✓ Ministry of state affairs ✓ Kalaroa Paurashava
Justification: Loss of lives and property of the Paurashava inhabitants will be minimized.	
Policy-Safety & and Security/2: Enhance the capacity of the fire service station with more trained personnel, modern equipment of fire extinguishing and vehicles equipped and ready for firefighting at any time.	✓ Department of fire service and civil defense ✓ Ministry of state affairs ✓ Kalaroa Paurashava
Justification: Loss of lives and property of the Paurashava inhabitants will be minimized.	
Policy-Safety & and Security/3: Reduce the risk of accidents and traffic conflicts at a minimum level by introducing automated signal system, proper traffic sign and symbol, road marking and other traffic management measures. Besides, arrangement of awareness building program may be an effective measures in this respect.	✓ Kalaroa Thana ✓ Police Department (Traffic) ✓ Kalaroa Paurashava
Justification: The probability of accident and the subsequent health hazard, loss of lives will be reduced.	
Policy-Safety & and Security/4: Hijacking, terrorist attack, robbery etc. will be wiped out by strict enforcement of law. The police department will play active role as a constant vigilant. The community leaders may also take actions in this issue.	✓ Kalaroa Thana ✓ Kalaroa Paurashava
Justification: Improved public safety will help to maintain the character of the community	

9.2 Physical Infrastructure Sector

9.2.1 Transport

By far, transport is the most important means to revitalize an urban center. Intra and inter transportation facilities create economies of scale for prospective investors and enables easy and comfortable mobility of the residents. Easy and cheaper transportation of raw materials and finished goods create good investment climate for manufacturing enterprises that lead to development of the service sector firms. New employment generates and the non-basic sector expands leading to thriving urban center. To create transportation facilities, quality inter-district road network will have to be created that makes movement faster and easy. With good infrastructure transport on the road will be forthcoming. Besides, quality of local roads will have to be upgraded to encourage people live in the town. Once population starts increasing it will expand local consumer market and will attract new investments in consumer goods production.

Strategy:

- Creation of efficient inter-city and intra-city communication for easy transportation of goods and passengers.

Policy:

Item	Executing Authority
Policy-Transport/1: Development of efficient inter-city road network with standard road.	✓ Roads and Highways Department (RHD)
Justification: Increased inter-city mobility will increase business transactions and generate investment and employment.	
Policy-Transport/2: Promotion of efficient road transport facilities between urban centers.	✓ Bangladesh Road Transport Authority (BRTA) ✓ Deputy Commissioner, Satkhira
Justification: Not only that communication is needed between urban centers, but to attract transport movement emphasis must be laid on quality of roads built.	
Policy-Transport/3: Development of local road network through participatory approach	✓ Kalaroa Paurashava ✓ Local Government Engineering Department (LGED)
Justification: Development of roads will involve huge cost. Participatory development will enable cost sharing, which will reduce cost of road construction substantially.	

9.2.2 Utility Services

Utility services are the most essential parts of urban life. To make an urban center livable there must be adequate provision for utility services including water supply, solid waste management, power supply, sanitation and drainage. Except power supply, the rest are the responsibility of Paurashava.

Strategy:

- Attainment of self reliance in revenue collection and adoption of participatory approach to service provision to ensure better services and facilities to the people.

Policy:

Item	Executing Agency
Policy-Utility/1: Exploration of alternative sources of water to ensure sustainable supply.	✓ LGED ✓ Kalaroa Paurashava
Justification: Amid constant rise of urban population, it is time to explore alternative sources of water, like, rain water harvesting and surface water supply.	
Policy-Utility/2: Involve beneficiary participation in solid waste management.	✓ Kalaroa Paurashava ✓ NGO and CBO
Justification: Involvement of beneficiaries in solid waste management will make the operation more effective and reduce financial responsibility of the Paurashava.	
Policy-Utility/3: Exploring re-use and recycling of waste materials to extract resources.	✓ Kalaroa Paurashava ✓ NGO and CBO
Justification: Re-use and recycling of waste materials will produce resources and reduce cost of waste management.	
Policy-Utility/4: Publicity on the benefits of hygienic sanitation to motivate people and enable people to have easy access to sanitary materials.	✓ LGED ✓ Kalaroa Paurashava ✓ NGO and CBO
Justification: Motivation will encourage people to adopt healthy sanitation and reduce health risks.	
Policy-Utility/5: Protection of natural drainage system and preparation of hierarchical drainage network.	✓ LGED ✓ Kalaroa Paurashava
Justification: Natural drainage systems are being grabbed and filled up, which increases the risk of water logging. Well planned hierarchical drainage network help smooth drainage of storm and waste water.	

9.2.3 Flood Control and Drainage

The Kalaroa Paurashava is free from flood. Flood caused by overflow of river water is called the external flood, while that caused due to lack of the drainage facilities is called the internal flood. Most of the drains of Kalaroa Paurashava have been constructed in an unplanned way without considering proper outfalls as piece meal, no proper size and gradient has been maintained. Those drains shall have to be excavated further downstream and to be linked them with the khals so that the runoff can recede freely. The existing khals shall have to rehabilitate with proper section and gradient so that they can function properly as primary drains that are sufficient to carry the total runoff of the Paurashava. For man-made primary drains, secondary and tertiary drains these khals shall be their outfalls. Besides, there are a number of ponds and ditches which can be utilized as water retention ponds for retaining the storm runoff generated from rainfall and hence reducing the vulnerability to internal flood.

Strategy:

- The Town should be protected from internal flood.

Policy:

Item	Executing Authority
Policy–Flood Control/1: Construction of embankment wherever necessary.	✓ BWDB ✓ Ministry of LGRD ✓ Kalaroa Paurashava
Justification: To save the life and property of people during external flood.	
Policy-Utility/5: Protection of natural drainage system and preparation of hierarchical drainage network.	✓ LGED ✓ Kalaroa Paurashava
Justification: Natural drainage systems are being grabbed and filled up, which increases the risk of water logging. Well planned hierarchical drainage network help smooth drainage of storm and waste water	

9.3 Environmental Issues

9.3.1 Natural Resource

The Kalaroa Paurashava is not endowed with many natural resources that can be conserved. Among the meager natural resources it has are, Betraboti River (6.03 km), 1019 no's of ponds and ditches (330.424 acres) and few natural khals. Out of the natural resources, all khals should be vested to Paurashava by the Ministry of Land for proper maintenance and also for the community interest. This will help prevent encroachment and un-authorized filling of natural khals and beels.

Strategy:

• The river and all khals should be vested with Paurashava for use in community interest.

Policy:

Item	Executing Agency
Policy-Nature/1: The river bank and all khas land within Paurashava must be assessed and Handed over to the Paurashava for use in community interest.	✓ Ministry of Land ✓ Kalaroa Paurashava
Justification: This will prevent misuse of river bank and khas land.	
Policy-Nature/2: The river bank and all khals within Paurashava must be vested with the Paurashava for maintenance and proper use as drainage channel.	✓ Ministry of Land ✓ NGO and CBO
Justification: This will help prevent unauthorized occupation and filling of natural drainage.	

9.3.2 Sanitation

There is no sewerage network in the Kalaroa Paurashava, only there are few sanitary latrines with septic tank and soak pit. The Paurashava claims that they have achieved to bring 100% of its population under sanitation coverage. There are 4264 households in Kalaroa Paurashava. 7% of its population have sanitary latrine with septic tank and soak pit, rest usages semi pacca latrines. The DPHE and Paurashava are the main implementing agencies for sanitation projects whereas the UNICEF, WORLD VISION, and other NGOs are their co-partners in different sanitation programs.

Strategy:

- All households of Kalaroa Paurashava should be provided with hygienic sanitation facilities.

Policy:

Item	Executing Agency
Policy-Sanitation/1: Septic tank, soak well and low-cost sanitation to be provided.	✓ Ministry of Public Health ✓ Kalaroa Paurashava
Justification: This will provide a proper hygienic sanitation of Kalaroa Paurashava.	
Policy-Sanitation/2: All the households are to be facilitates with sanitation facilities.	✓ DPHE ✓ NGO and UNICEF, WORLD VISION, BRAC, Proshika, etc.
Justification: This will help the deprived households.	

9.3.3 Hazard

In Kalaroa Paurashava natural hazards can be identified into storm, cyclone, nor'wester, tornado, flood, earth quake etc. The frequency of the Norwesters is maximum in April, whereas there are a few in May and minimum in March. The Norwesters and Tornadoes cause uproot trees, telephone and electricity lines, loss of human life and biodiversity, injury of life, damage and destruction of property, damage of cash crops, disruption in lifestyle, damage to essential services, and national economic loss.

From rainfall data of Kalaroa from year 1988 to 2007, the calculated mean annual rainfall stands 2569 mm. Every year the Kalaroa Paurashava is either partly or fully inundated by flood.

Strategy:

- All preventive measures and pre-disaster preparedness, rescue & evacuation operation during disaster and post-disaster relief & rehabilitation are to be adopted.

Policy:

Item	Executing Agency
Policy-Hazard/1: Natural khals and river are to be preserved as a discharging point (outfall) of drainage water and necessary embankment to be constructed.	✓ BWDB, LGED ✓ Kalaroa Paurashava
Justification: This will reduce flood water and facilitate the discharging process.	
Policy-Hazard/2: All physical structures (including houses) should be designed in such a way so that it can resist/prevent any natural hazard.	✓ Kalaroa Paurashava
Justification: Structures with raised plinth level and earthquake resistant design can reduce loss of human life, damage and destruction of property.	
Policy-Hazard/3: Establishment of new flood shelter and develop the educational institutions as a place of shelter during devastating flood hazard.	✓ Ministry of Education ✓ Disaster Management Bureau ✓ Kalaroa Paurashava
Justification: This will reduce the loss of lives and property caused by flood.	

Policy-Hazard/4: Provision of rescue and evacuation operation during severe flood	✓ Bangladesh Army ✓ Fire service and civil defense ✓ Police department ✓ Kalaroa Paurashava
Justification: This will reduce the loss of lives and property caused by flood.	
Policy-Hazard/5: Arrangement of post disaster relief and rehabilitation program will be undertaken	✓ Disaster Management Bureau ✓ Ministry of food and disaster management ✓ Kalaroa Paurashava
Justification: The flood affected people will be able to overcome from the hazard within very short time.	

9.3.4 Environmental Aspects (Air, Water, Soil, etc. Quality)

A review of ambient environmental trends in Bangladesh showed that suspended particulate matter exceeded ambient standards in all major cities in Bangladesh. The suspended particulate matter problem is most acute in the highly populated and industrial areas. The major sources of suspended particulate matter are re-suspended road dusts (mostly coarse particles from construction activities), vehicular emissions (mostly fine pnb 0.3 articles) and industrial sources like brick kiln and cement factories. Fortunately those are very minor scale in Kalaroa Paurashava.

Protection and preservation of the natural environment is essential for sustainable development. Given that most of the country's environmental resources are linked to water resources, it is vital that the continued development and management of the nation's water resources should include the protection, restoration, and preservation of the environment and its bio-diversity including wetlands, mangrove and other national forests, endangered species, and the water quality. Accordingly, water resource management actions will take care to avoid or minimize environmental damages.

The soil consists of active natural levee, flood plain, and sand bar, point bar sediments composed of naturally low to medium compact sandy silt, sandy clay, organic clay, loose sand, depression and abandoned channel sediments.

Strategy:

- The environment comprising air, water and land should be enhanced and promoted.

Policy:

Item	Executing Agency
Policy-Air/1: Air pollution should be reduced through banning of two-stroke three wheelers, introduction of high-rise chimneys in the industries	✓ BRTA, DoE ✓ Kalaroa Paurashava
Justification: This will reduce the amount of CO, CO_2, SPM, lead and other heavy metals, harmful chemicals which are injurious to health.	
Policy-Water/2: Protection, restoration and preservation of water resources and reduction of pollution should be done.	✓ DoE, DPHE, BWDB ✓ Kalaroa Paurashava
Justification: This will restrain the natural drainage system, ecology, biodiversity of the Paurashava and will ensure clean and livable environment.	
Policy-Soil/3: Soil pollution should be minimized though reduction of chemical fertilizer, synthetic pesticides and introduction of rotations in the farming system.	✓ Department of Agricultural Extension, Upazila Parishad ✓ Kalaroa Paurashava
Justification: This will enhance soil fertility resulting high crop yield and reduce water pollution.	

Chapter 10

Implementation Issues

This chapter deals with the issues of implementation of the Master Plan. Here, recommendations have been made about capacity building and resource mobilization for the implementation of the plan.

10.1 Institutional Capacity Building of the Paurashava

In the present context of spatial and legal jurisdiction of the Paurashava for planned development of its area, some recommendations are made here. Also, observing the financial and Institutional strength of individual stakeholders in relation to their liabilities and identifying their shortages and absence of any perfect coordinating body, some suggestions have been made as remedial measures as a whole.

- All urban local governments including Upazila level Paurashavas must be given more independence and autonomy to perform their responsibilities. At the same time, their accountability to the government and people regarding their performance has to be ensured. For this purpose the legal framework of the urban local governments has to be reviewed and updated. The legal provisions have to be consolidated and simplified and make them compatible to changing circumstances. Opportunities must be created in the Act allowing scope for privatization of service providing activities.
- To avoid duplication of development functions, there should be clear line of separation between central government and the urban local government.
- A double entry cash accounting system has to be introduced to modernize the accounting system. For this purpose, massive training programme has to be arranged for the relevant municipal staff.
- To improve revenue collection, the urban local governments should be given more power and responsibilities. Measures should be taken for strengthening the Paurashava administration for municipal development.
- Section-50 of the Paurashava Act needs to be revised and more power should be given to the Executive Officer for appointment of employees.

It cannot virtually function effectively as a Paurashava under such a stringent financial condition. To function, effectively, it must raise its revenue earning. But it is reported that the Paurashava cannot collect all its holding tax from the citizens. Holding tax is the most important source of its own revenue earning. It must take care to ensure 100% recovery of holding tax. The Paurashava cannot function effectively depending upon government grant only. The existing manpower position of the Engineering, Development control and Accounts should be substantially raised to handle future volume of work. Moreover, additional staff especially for the implementation of Master Plan will soon be required.

The present plan package imposes a large number of development projects on Kalaroa Paurashava for implementation. Paurashava will not only be the custodian of the plan, it will also directly implement much of the development projects. Besides, it will also be

responsible for monitoring and implementation of the development projects by other urban development and service giving agencies. This situation calls for strengthening of the existing capability of Paurashava.

10.1.1 Staffing and Training

As a traditional system of the Paurashava, engineer and secretary are appointed directly by the Ministry of Local Government and other staffs are appointed locally through the approval of the Ministry after the advertisement on the newspapers. In Kalaroa Paurashava, the revenue income is too low. That is why it is not capable to pay the salary of all the officials and staffs. This is the main reason for under staffing of the Paurashava.

There is no proper arrangement for staff training. As a result, the staffs are mostly unskilled. They cannot deliver proper service to the citizens. Besides, most of them are not qualified enough to render proper services.

10.1.2 Lack of Automation

Most works in the Paurashava are done manually. Such practice delays works and deprives the citizens from services. This is also a source of mal-practice and corruption. Modern office and working equipment should be installed. Use of modern technology will increase efficiency in planning and record keeping, finally expedite decision making process.

10.1.3 Town Planning Capacity

At present, the Paurashava has no town planning section or any appropriate manpower to prepare and implement the Master Plan. The Paurashava must strengthen its capacity to implement its Master Plan when it will be completed. It will otherwise be in trouble in the implementation, monitoring and updating the Master Plan.

10.1.3.1 Institutional Framework (Proposed by UGIIP, LGED)

To rearrange the institutional framework for the Paurashavas recently the government has made a committee for the categorization of all the Paurashavas of Bangladesh. According to the clause no. 72-78 (Paurashava Officer & staff, provident fund etc.) of Local Government (Paurashava) Act, 2009 and on the basis of the type and category of works, the committee suggested 5 divisions within the Paurashava framework. Afterward on the basis of the type of works, similarities and technicalities each division is further subdivided into some sections accordingly. The suggested divisions and sections are as follows:

Planning Division: a) IT Section

b) Planning Section

c) Beautification and recreation Section

According to the divisions and their relevant sections the manpower should be set up for each category of Paurashava. The above committee has also chalked out the detail scope of work for each division. The scope of proposed Planning Division is given in Figure 10.1.

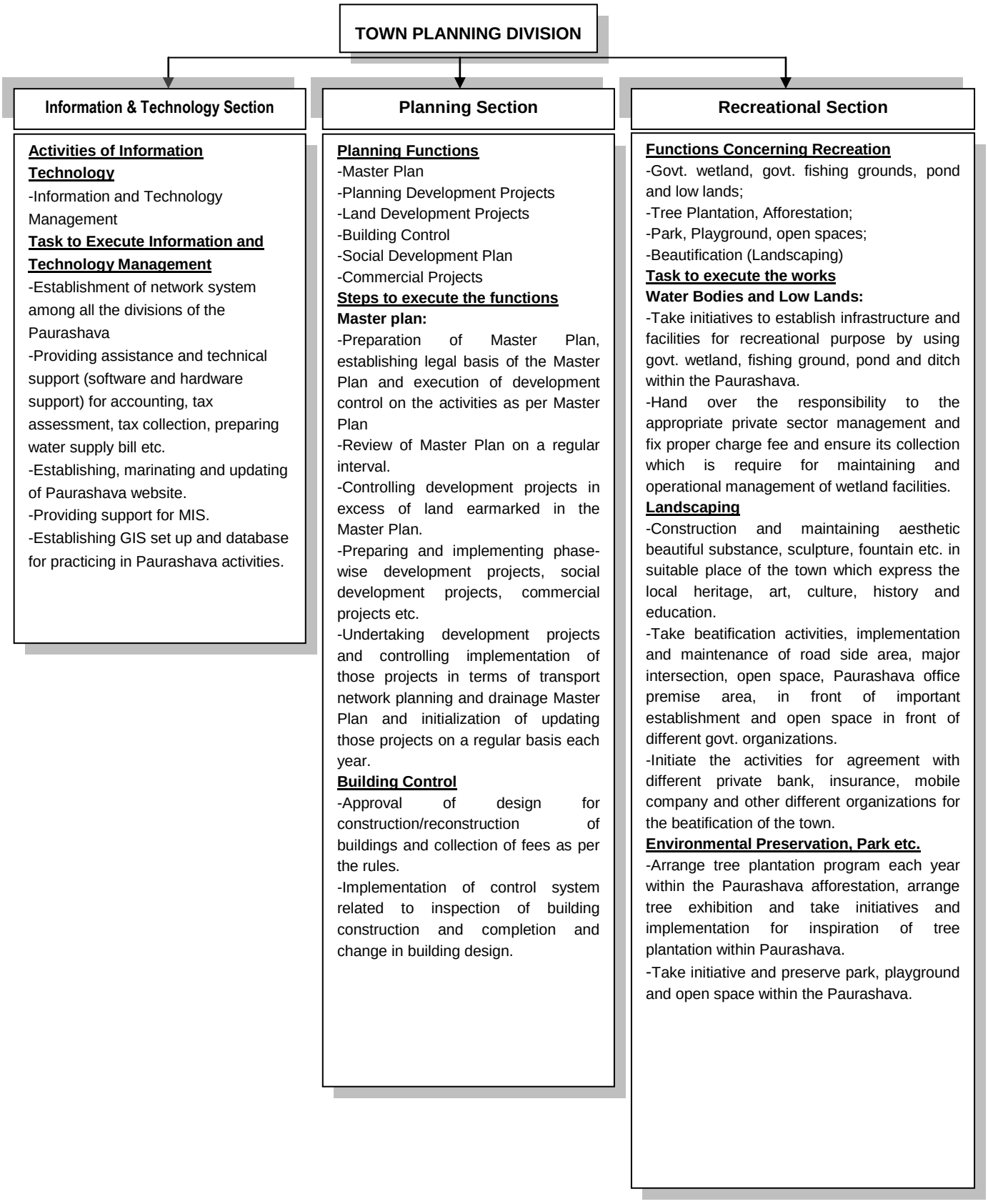

Figure 22.1: Scope of Work for Planning Division

10.1.3.2 Lack of Paurashava Town Planning Capacity

At present, the Paurashava has no town planning division or any appropriate manpower to prepare and implement the Master Plan. For proper implementation of the Master Plan in each Paurashava establishment of a separate planning division is indispensable. The Paurashava must strengthen its capacity to implement its Master Plan when it will be completed. It will otherwise be in trouble for implementation, monitoring and updating the Master Plan.

Kalaroa is a 'B' class Paurashava. For the 'B' class Paurashava Government approved an organogram and required manpower. A comparison of the existing manpower with the approved organogram finds that there is a huge gap between the two. Many positions have been vacant since the inception of Paurashava. Paurashava authority supported with the line ministry should take necessary steps to set up planning unit and strengthen all units/division of the Paurashava for its better performance.

Support for Planned Urbanization

For creating planned urbanization, Paurashava may:

- Support for preparation of Computerized Infrastructure Database.
- Support for Preparation of Paurashava Base Map.
- Support for Preparation of Paurashava Infrastructure Development Plan.
- Orientation on preparation, use, update & implementation of Paurashava Master Plan.
- Assist preparation and execution of Community Development Plan by Community Based Organization (CBO).
- Introduce 3D-Modeling in Master Planning components.
- Beautification of Paurashava by 3D-Modeling.

Community Mobilization Program

Following are the community mobilization support activities:

- Support to establish Town Level Coordination Committee (TLCC) and make it functional
- Support to establish Ward Committee (WC) and make it functional.
- Support for preparation of Community Planning and implementation by forming Community Based Organization (CBO).
- Support to accelerate the Paurashava Standing Committee activities.

Urban Governance Improvement Action Programme (UGIAP)

- It is stipulated in the 6th 5 year plan 'the Key constrains to the effective functioning of the Paurashavas and City Corporations are unclear mandate and service responsibilities; lack of accountability; weak finances and financial autonomy; poor coordination and control among service agencies and weak management'.

- To overcome the challenges, the 6th Five year plan as well as Perspective Plan of Bangladesh, 2011-31 recommends the same issues mentioned below:
- the instructional reform and decentralization of responsibilities and resources to local authorities; participation of civil society including woman in the design, implementation and monitoring of local priorities; building capacity of all actors (*Institutions, groups and individuals*) to contribute fully to decision making an urban development process; and facilitate networking at all levels.

It is already tested, proven and accordingly recognized in the 6th Five year plan that urban infrastructure improvements have been proved very successful introducing governance and performance-based approach adapted by UGIIP in selected ULBs in the country. Among other suggestions the 6th Five year plan also includes nature for Urban Governance Improvement Action Progamme (UGIAP) and Capacity Building of Institutes at Municipality-level in particular.

Citizen Awareness and Participation

The Paurashava authority may initiate to buildup citizen awareness and to ensure peoples participation in plan initiation and implementation process. Initiatives may be as follows:

- Establishment of Civil Society Coordination Committee (CSCC) and make it functional
- Establishment of Ward Level Coordination Committee (WLCC) and make it functional
- Citizen Charter display at Paura Bhaban.
- Citizen Report Card Survey by the Paurashava.
- Establishment of Grievance Redress Cell and make it functional with specific ToR
- Establishment of Mass Communication Cell (MCC) and make it functional
- Establishment of Urban Development Coordination Unit with inclusion of other departments for inclusive development

Urban Planning and Environmental Improvement

- Master plan is a guideline and detail urban planning activities are being prescribed in the plan. To produce a livable environment in the Paurashava premises, following initiatives should be taken:
- Recruitment of staffs and establish Planning Department related to administrative structure, meeting and meeting minutes preparation.
- Master Plan, Base Map verification and update landuse plan preparation.
- Approval of building plan and development control.
- Introduction of environment and public health activities.

Urban Poverty Reduction

Following initiatives can be taken by the Paurashava for urban poverty reduction:

- Establishment of Slum Improvement Committee (SIC) in selected slums and scattered area.

- Preparation of poverty reduction action plan with guideline and necessary budget allocation.

Income Generating Activities

The income generating activities include:

- Tax assessment software use and capacity development for staffs of assessment section.
- Continue reassessment activities regularly at 5 years interval.
- Continue interim assessment regularly in whole year.
- Introduction of computerized tax system and bill preparation.
- Increase collection by more than 5% annually (*up to 85% collection efficiency*).
- Increase non-tax own revenue source atleast by inflation rate.
- Introduction of computerized trade license system and computer bill/ license prepared and report produced.
- Introduction of computerized Water bill (*Tariff*) system.
- Introduction of Computerized non-motorized vehicle management system.
- Identification of new income sources for increasing income.

Transparency and Accountability

Functions and activities perform by the Paurashava authority should be transparent and the persons responsible for performing activities for betterment of the society should maintain accountability to the Paurashava people as well as central government. Following guidelines may be followed for such performances:

- Administrative Reformation of Paurashava.
- Set Vision, Mission and functions for each department/ section of the Paurashava.
- Functions to be decentralized, transfer and coordination with other authorities.
- Establishment of Capacity Development Committee in Paurashava-level.
- Establishment of Urban Information Services Centre at Paurashava premises.
- Meet the Mass people of Paura-Parishad.

10.1.4 Legal Aspects

The drive to establish strong urban local governance in the Paurashava is yet to be legalized. The governance programmes at present are operated project wise based on the formulated policies of the implementing agencies of the national government. The Laws that the country inherited are mostly prepared during the colonial rule to serve its own interests. Even after independence from the British, the issue of good governance was not infused into the new Acts formulated.

10.1.5 Good Governance in Legal Provisions

There is hardly any Act where the elements of good governance are clearly visible. The consultant has identified some Acts, where some elements of good governance can be traced.

The Paurashava/Municipal Act/Ordinances prepared at different times since 1960's have iterated for the preparation of Master Plan by the Paurashava/Municipality for its planned development. So far urban local government Ordinances/Acts made in 1967, 1977, 2008 and 2009, all suggested for planned development. The Local Government (Paurashava) Act, 2009 has made the provision of having a Master Plan prepared by a Paurashava within five years of its inception. The function of the Paurashava also includes that it ensures planned development following the rules of the Local Government (Paurashava) Act 2009. But there is no provision for public participation in the Local Government (Paurashava) Act 2009. In all these legal documents, people's role has been ignored which is the violation of the norms of good governance.

The constitution of the Peoples' republic of Bangladesh clearly spells out that the Government should work to minimize the gap between urban and rural areas. A planned Paurashava development in that pursuit can provide necessary services to improve quality of life in both urban and rural areas within the Upazila.

10.1.6 Financial Issues

Governance in Kalaroa Paurashava

Financial governance refers to transparency and accountability of financial matters. All financial matters must be transparent to all. People must know about the policies and programs of the Paurashava, how much revenue is collected each year and the amount of expenditure made on annual development. They must also be answerable to the people on how the public money is being spent and accounts being maintained.

The Ministry of LGRD and Cooperative has undertaken a number of projects in respect of establishing governance in upgrading Paurashava accounts system, like, UGIIP, STIFPP. Computer and accessories are supplied under these projects for automation of the accounts system. Besides, trainings are also offered to the Paurashava accounts staff for enabling introduction of automation in accounts system. But all these services have not yet reached Kalaroa Paurashava.

Revenue Management

The Paurashava still follows a traditional management system in tax collection and revenue management though a scheme of computerized automotive financial system has already been introduced in this Paurashava. Assessment section is responsible to assess the tax of the Paurashava and tax collection, and license and bazar section are responsible to collect the tax of the Paurashava. The public is mainly informed about tax collection during the presentation of annual budget. They may, however, get information from the councilor or Paurashava accounts office.

Paurashava's Financial Capacity and Plan Execution

The main focus of Paurashava financial governance is to establish automation in entire

financial management. This includes computerization of accounts system, holding tax management, and billing of different service charges. Software for above functions have been supplied and installed in the Paurashavas covered by financial automotive projects. The projects also provided training to the relevant staffs for functioning of the systems. With the implementation of these projects people can now instantly know about the status of their tax payment, bill payment, and licensing. This has not only made the functions of the Paurashava easy, but also has freed the citizens for paying bribe, and experiencing hassle.

The size of annual budgets of the Paurashavas indicates the poor financial status of the Paurashavas. With low income, Kalaroa Paurashava will have to depend substantially on the government funding for implementing the development projects. But the government has limitations of its resources. In such a situation, if the Paurashava cannot raise its own revenue adequately, it will not be able to execute much of the development projects under the Master Plan.

10.1.7 Monitoring, Evaluation and Updating

Monitoring and evaluation is a very important part of plan implementation. Monitoring helps check if the plan is being implemented properly. It also measures the level of implementation of the plan. If the plan implementation is not on track, corrective measures can be taken to put execution on the track. After expiry of any plan, evaluation is made about the errors and omissions. Such evaluation helps take corrective measures in the next plan. Such monitoring and evaluation must be carried out from within the Paurashava. But Kalaroa Paurashava is not equipped with qualified manpower to make such evaluation. Monitoring and evaluation of a plan is essentially, the responsibility of qualified and experienced planners. As there is no planner in the Paurashava, monitoring of plan implementation will be seriously affected. However, plan evaluation can be accomplished by means of out sourcing as and when it is required.

10.1.8 Periodic Review and Updating

The plan package needs to be updated regularly to make it respond to the spatial changes over time. But such updating would require relevant technical professionals and requisite fund that are highly lacking in Kalaroa Paurashava. As there is no planner or planning section in the Paurashava, review and updating of the Master Plan will require service of senior level planners that Paurashava might not be able to provide. This service will have to be procured by out sourcing and the Paurashava is not even capable to accomplish this financially either. This will create problem when the plans or its components gets obsolete or need to be changed. Another problem would arise when the duration of plans ends. It is necessary that the entire plan document (including all planning and land use proposals) should be reviewed every 4th year of the plan period and will come into execution from the 5th year. The aim of the review will be to analyze the status of implementation of plan provisions, the changing physical growth pattern, infrastructure development, and the trend of public and private physical development including growth direction.

A new set of plans will have to be prepared replacing the old ones. This problem, however, can be overcome by undertaking another planning project by LGED. So, for regular updating and changes, and plan implementation monitoring, the Paurashava should

immediately set up a planning section with a number of planners and other staff. The section will not only look after planning, but will also be responsible for development control, estate management, and project preparation. Since the planners would be qualified and skilled in computer operation, they can also help achieving automation of the Paurashava functions.

10.2 Resource Mobilization

Resource mobilization will be one of the most challenging tasks in implementing the current plan package. Though the development proposals are said to be executed by a large number of development agencies, but it is beyond doubt that the heaviest burdens will have to be shouldered by the Paurashava. As a local government agency, it suffers from resource constraint due to low level of urbanization and investment by both public and private sectors. The land value will maintain perpetually low growth rate in the town. Therefore, prospect of mobilization of substantial resource from sale of serviced land is extremely meager. For the same reason, revenue earning from betterment fee, planning permission and other sources may also remain low. Paurashava is heavily dependent on the government for executing its development projects as it is unable to collect sufficient revenue from its tax and non-tax sources. Therefore, it is clear that execution of development projects under the current plan will depend heavily on the government response to supply adequate fund. This situation calls for increasing revenue earning by generating new revenue sources.

10.3 Concluding Remarks

From the past experience, it has been observed that plans are prepared for organized development, but development control has been subject to negligence. In most cases, execution has been piece-meal. It is unfortunate that town planning has not yet become a part of our urban development culture. Individuals develop lands and construct buildings with a little respect for planned development, and the concerned authority is also unable to exercise full control on development. Some strict measures are necessary to make stakeholders follow up plans and development rules. Awareness is to be built among the people to follow the Master Plan provisions and plan. Government agencies must be compelled to follow plans. Existing laws in this regard must be updated incorporating provisions of plan execution.

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Chapter 11

Urban Area Plan

11.1 Introduction

The second tier of UTIDP master Plan package of Kalaroa Paurashava is the Urban Area Plan followed by the Structure Plan. The Urban Area Plan (UAP) consists of the following plans: Land Use Plan, Transportation and Traffic Management Plan and Drainage & Environmental Management Plan and Plan for Urban Services. Part-B of the Report entails the objectives, purpose and the role of Urban Area Plan and its relation with Structure Plan and the planning standard. The development plan proposals and land use zoning provisions are envisaged in The Urban Area Plan in the light of policy prescriptions of Structure Plan for a medium term.

11.2 Content and Form of Urban Area Plan

The Urban Area Plan covers existing urban area of Kalaroa Paurashava and has a ten years time-frame from 2011 to 2021. It comprises Part-B of the explanatory report supported by necessary maps.

The Urban Area Plan is concerned only with the area where the greatest change is expected in the medium term (10 years). For this area, it indicates how the Structure Plan policies might be pursued whilst also giving greater precision to the spatial dimension of the policies.

The outline of the Urban Area Plan gives guidance to the Paurashava as to how it can develop the roles i.e. to promote development, to co-ordinate development and to control development The Urban Area Plan has been divided into four main parts. These are preceded by four introductory chapters which explain the scope of the report and provide background to the Urban Area Plan including its relationship with the Structure Plan.

Part-B of the report starts with the Land use Plan. The Land use Plan identifies approaches of planning, existing and projected land use and proposed land use. Requirement of land for different purposes, land use zoning and plan implementation strategies are also included here.

The Transportation and Traffic Management Plan includes existing conditions of transportation facilities, intensity of traffic volume, degree of traffic congestion and delay, analysis of existing deficiencies, travel demand forecasting for next 20 years, future traffic volume and level of services and transportation development plan. Moreover, transportation system management strategy and plan implementation strategies are also presented in this plan.

Drainage and Environmental Management Plan is the third chapter of the Urban Area Plan. The chapter again subdivided into two parts- Drainage Plan and Environment Management Plan. Existing drainage network, land level and topography, plan for drainage management and flood control and plan implementation strategies are the components of the drainage plan. Existing environmental condition, solid waste and

Garbage disposal, environment pollution, water logging, natural calamities and localized hazards, plan for environmental management and pollution control and plan implementation strategies are the key issues of the environment management plan.

Fourth part of this report is Plan for Urban Services. Existing condition and demand of the Services, projection on existing and proposed Urban Services, Proposals for Urban Services and Implementation, monitoring and evaluation of the Urban Services Plan are the key issues of this part.

11.3 Area of Urban Area Plan

The Paurashava area of Kalaroa as per gazette notification is considered as the area of Urban Area Plan. This area is the same as the Structure Plan area or Planning area. The Urban Area Plan of Kalaroa Paurashava covers an area of 3676.448 acres that is 14.878 sq.km. The total Paurashava area has been regarded as the area of Urban Area Plan since the Paurashava Authority has the responsibility of providing basic urban services and facilities in the entire jurisdiction area.

11.4 Function of Urban Area Plan

Urban Area Plan is prepared for managing and promoting development over medium terms following the broad guidelines set by the longer term Structure Plan. It shows the urban structure of sub- system in space over the medium term and identifies broad programs of direct action especially related to infrastructure development, institutional issues as well as broad financing strategies. The plan may also outline more specific area-wise development policies to guide development over the medium terms, one major objective of preparing Urban Area Plan is the consolidation of development activities by various agencies in areas that have strongest potential for growth in the medium term and can accommodate the anticipated volume of growth. Other purpose of preparing Urban Area Plan is to facilitate the development control function. It shows the broad land use zones on a more detailed scale of maps as derived from Structure Plan.

11.5 Duration and Amendment of Urban Area Plan

The duration of Urban Area Plan (Land Use Plan, Transportation and Traffic Management Plan, Drainage and Environmental Management Plan and Urban Services Plan) of Kalaroa Paurashava will be 10 years and that will remain valid till 2031. A new Urban Area Plan will replace the current plan after its validity to be expired in 2031. The next plan will remain valid for rest of Structure Plan period. Mid term revision of the plan should be carried out during the 4th year (2021) of the plan period. However, any amendment of the plan can be carried out any time on public interest.

Chapter 12

Landuse Plan

12.1 Introduction

This is the first chapter of Part- B that starts with Land Use Plan of Urban Area Plan. Land use plan covers the existing and projected land uses of urban area of the Paurashava. It lays down the land use policies, guidelines and proposals including land use zoning plan. It also states the plan implementation strategy at the town level.

The land use plan, a major component of Urban Area Plan, is an official document with legal backing, consisting of a report and necessary maps prepared by the consultant, which sets forth major policies to guide the physical development of the town. The land use plan is prepared by the consultant for a specified time period, following the full development of Paurashava considering the existing land uses and future demand of the area and population. It will interpret the Structure Plan proposal and policy. The future land uses, zoning, land development regulations for the future probable population have been indicated through land use plan.

12.2 Goals and Objectives

The broad goals of land use plan are to create an urban space for habitation with comfort, a livable urban environment for economic flourishment and social cohesion and to ensure the optimum and conforming use of land in the built-up areas and its immediate surroundings, potential for development. Urban Area Plan aimed at interpreting the long-term broad policies and guidelines of Structure Plan over the medium term (10 years) is composed four components, as such Land Use Plan, Traffic and Transportation Management Plan, Drainage and Environmental management Plan and Plan for Urban Services. Thus, Land Use Plan is one of the major components of UAP providing land use policies, strategies and guidelines in the urban growth areas of Kalaroa Paurashava. Major objectives of Land Use Plan of Kalaroa Paurashava can be summarized as follows:

- Consolidate the Core Area to accommodate most urban growth within next 10 years (2011-2021).
- Promote mixed-use development (mainly Residential-Commercial) in the built-up area permitting compatible uses.
- Develop the central area as a commercial hub for higher order commercial activities.
- Promote several growth centers for the least developed areas to meet only the local needs.
- Locate the industrial area apart from residential areas with better transportation access in order to ensure better living environment.
- Encourage new development to be innovative and to protect natural and cultural resources.
- Where possible, promote land preservation through conservation easements and sound development practices.

- Encourage the land best suited for agriculture to remain agricultural
- Encourage more dense residential and commercial development in the existing built-up areas.

12.3 Methodology and Approach to Planning

Landuse Planning starts with the collection of information on existing landuse derived from landuse survey indicating the use of each plot by its functional quality such as residential, industrial, commercial, health service etc. Total Station and DGPS survey technique was used for land use survey.

Spatial and attribute data of all existing landuses from landuse survey was processed and stored under a comprehensive GIS database component. GIS software such as PC ArcView and PC ArcInfo (Version as suggested in the ToR) has been used for processing of physical feature survey data. Data was stored in WGS-1984 format (latitude, longitude, ellipsoidal height in meter) and later on, it was projected and stored in Lambert Conformal Conic (LCC) projection system.

The survey team carried out the land use survey simultaneously with topographic and physical feature surveys. Most land use information were collected during physical feature survey through personal inquiry of the building/space users. Land use information was extracted from survey according to use of land by its functional activity such as residential, commercial, industrial etc. Each survey feature was recorded with individual ID or Code. A detailed land use category with their user ID selected by the coordination of different experts of consulting groups and approved by LGED was followed for land use survey. The land use features were identified, classified and separated in different layers during data processing stage. The existing land use map was prepared indicating the broad categories of land uses on the RS Mouza map at a scale of 1:1980 as per ToR.

Based on the existing landuse map, the landuse plan was prepared according to the guidelines given by the ToR. The planning starts from formulation of strategies to issues like functional quality (meeting of space requirements for different functions, relation between functions etc., aesthetic quality, flexibility, deviation, public agency support etc.) for plan implementation. The planning in detail also covers the delineated existing urban area and the new urban area.

The formulation of Landuse Plan involves the following systematic approaches:

At the **First phase** of the planning process, review of previous plans and higher-level plans concerned with the development of Kalaroa Paurashava area was tried to find. But no higher level plan was found for the Paurashava.

The **Second phase** of the process comprises formulation of planning principles and standards addressing the landuse, infrastructures and utility services. This is an important stage in design process, crucial to the final functional quality of the result and its efficiency and cost effectiveness. These planning principles and standards address two distinct situations: existing urban area and new urban areas.

Population projection based on analysis of the growth trend from previous Censuses (1981-2011) was performed in the **Third phase**. In projecting the future population of the

target years at two distinct phases (2011-2021 and 2021-2031), Compound rate of growth method was adopted assuming a growth rate from past trends.

At the **Fourth phase**, land requirements for each specific land uses was determined based on projected population for a cycle of 10 years up to 2031 and the recommended Planning Standards approved by the PMO of LGED. After estimating land requirements, tentative allocation of specific land use proposals was made based on land suitability analysis and was drafted on base map.

The **Fifth phase** of the planning process involves conducting public consultation meeting with local communities/ beneficiaries and other agencies / interest groups (stakeholders). Views and ideas regarding proposed uses resulting from the consultation meeting held on 0506/2013 among all the stakeholders involved with the development of the Paurashava area was then summarized and incorporated in this report as an explanatory report as well as a fourth overlay on the base map.

At this stage, a land suitability analysis was performed on a qualitative basis through field visits, consultation meeting, analysis of topographic map, physical feature map and soil condition to justify the suitability of land for a specific use. Land allocation is a process which depends on the demand and supply of land. Whereas land suitability yields information on supply, land requirements indicate demand of land available for development. Final land allocation or land use recommendation for competing uses was then shown on proposed land use plan map and described in detail in the explanatory report.

The consultants formulated an integrated Landuse Plan at the Sixth phase. The integrated Landuse Plan was formulated through the consolidation of inputs from different sectors, local leaders, interest groups, etc. At the same time assessment was made on future economic, social and environmental impact of the integrated plan and its financial viability.

Finally, the development proposals of the plan have been prioritized and phasing out.

12.4 Delineation of Planning Areas

In the preparation of Master Plan the ToR assigns the delineation of Planning Area. During the survey work, planning area has been delineated. In the delineation of planning area, the area of Paurashava as declared in 1990 by gazette notification was considered. The total Planning area covered 14.878 square-kilometers. It included 9 Mouzas with full and partial plot numbers.

Once the Paurashava area as per gazette notification was determined, the planning area was then delineated based on systematic procedure.

At the next step, the trend of growth of the Paurashava area for the last 30 years was determined along with assessing the potentiality of the adjoining area. Therefore, based on the existing area of Paurashava and assessing the trend of growth and potentiality through intensive survey, the necessity for probable extension of the existing area was determined in consultation with the representatives of the Paurashava. The planning area was discussed in the Paurashava monthly meeting held on 24/07/2009. It was discussed in the meeting that the existing area of the Paurashava covers an area of 14.878 sq.km, most of which is agricultural and rural in nature. As, this area is sufficient enough to accommodate the future growth for the next 20 years and the adjoining area is not so

potential, it was decided in the meeting led by the Mayor to continue the prevailing area of the Paurashava without any extension.

Thus the existing Paurashava areas have been considered as the Planning area in the formulation of Structure Plan, Urban Area Plan and Ward Action Plan. The Paurashava area and planning area has been finalized as 14.878 sq.km. The delineation of planning area was supported by the minutes of the Paurashava meeting and is shown in **Map 12.1**.

12.5 Content and Form of Landuse Plan

The Landuse Plan covers existing urban areas of Kalaroa Paurashava and its immediate surroundings and has a ten years time-frame from 2011 to 2021. It also comprises a report and a map. The planning map depicts the proposed land use, zoning, infrastructure development and other development proposals. Report elaborates all the proposals made in the plan including rules, regulations and recommendations for implementation of the plan.

Part-B of the report starts with the Landuse Plan. The Landuse Plan identifies approaches of planning, existing and projected landuse and proposed landuse. Requirement of land for different purposes, landuse zoning and plan implementation strategies are also included here.

Map 25.1: Delineation of Planning Area Map of Kalaroa Paurashava

12.6 Existing and Projected Land Use

12.6.1 Introduction

The spatial structure and land use pattern of project area have been mostly the result of natural growth. Here although a development took place during the last decade yet the project area is still predominantly agricultural in character. Urban growth is found in mainly middle part of the project area. Residential rural settlements are also found along the major roads and in almost scattered manner in the peripheral area. The Agriculture land use covers the major part (67.36 percent) of the project area while a major portion of land of the project area is under Residential use (16.09 percent). The roads inside the project area are quite narrow. The shops and different commercial establishments followed along internal roads.

The most driving factors of landuse change is the income of the people, government policy, new establishment like industry, higher level educational institute, construction of road and embankment and availability of services. The Paurashava was developed as a growth center long before, then a police station. In the year 1990, it is notified as Paurashava. Radical change of landuse in the Paurashava is not found. Before it known as Paurashava, agricultural domination was the key landuse. During last ten years, the landuse scenarios remain same. The broad categories of land uses of the project area are presented in **Table 12.1**.

Table 25.1: **Existing Land use**

SL. No.	Land Use	Area in Acres	% of Area
01	Agricultural	2479.169	67.36
02	Circulation Network	61.661	1.68
03	Commercial Activity	22.944	0.62
04	Community Service	6.376	0.17
05	Educational Facility	25.530	0.69
06	Forest Area	0.000	0.00
07	Governmental Services	11.107	0.30
08	Manufacturing and Processing Activity	10.594	0.29
09	Miscellaneous	0.000	0.00
10	Mixed Use	10.110	0.27
11	Non Government Services	1.241	0.03
12	Recreational Facilities	1.052	0.03
13	Residential	592.212	16.09
14	Restricted Area	0.000	0.00
15	Service Activity	9.865	0.27
16	Transport & Communication	4.914	0.13
17	Urban Green Space	4.414	0.12
18	Vacant Land	55.232	1.50
19	Water Body	383.892	10.43
Total		**3680.314**	**100.00**

Source: Land Use Survey by DDC, 2008-2009

Map 25.2: Existing Land Use Map of Kalaroa Paurashava

12.6.2 Analysis and projection on existing and proposed land uses

Kalaroa Paurashava has not been evolved as an ideal township. The Paurashava was declared with an area of vast agricultural land focusing built-up land in the Upazila Headquarters only. Growth of population is the natural trend and at the same time, expansion of non-agricultural use on agriculture land is also natural tendency of the people. This unplanned, scattered and horizontal development will be controlled by promoting certain policy prescriptions and proper planning proposals emphasizing compact township concept. Vertical development can also be encouraged and introduced in order to optimize urban land resource and minimize the misuse of valuable agricultural land.

Kalaroa Paurashava exhibits both rural and urban characteristics. Rural characteristics relate to the drivers of the economy through agricultural linkages. Urban characteristics may relate to the role of light industry, small business and service activity in the economy but are more often linked to living conditions as a function of density and changing social systems as a reflection of increased diversity. Agro-based economy is proposed to retain in the landuse plan and a certain percentage of existing agricultural land is proposed to continue farming practice. However, provisions for encouraging non-agricultural activity are made to enhance the living standard of the Paurashava inhabitants as well as to raise the economic base of the Paurashava as a whole. General industrial zone, heavy industrial zone and commercial zone of a considerable amount of land are proposed to allocate in the landuse plan with a view to accelerate non-agricultural activity.

Proposed landuse of Kalaroa Paurashava is projected based on the projected population and Planning Standards for UTIDP provided by LGED after finalization through several consultations meeting with the consultants. Proposed landuse is projected for the target year 2021 and 2031. As such, the time frame of Urban Area Plan is 10 years, 2021 is considered as the target year for implementation of the landuse plan. Following the planning standard of UTIDP, projected landuse of Kalaroa Paurashava has been calculated and shown in **Table-12.2**.

Table 25.2: **Projected Landuse of Kalaroa Paurashava**

Facilities	Standard (LGED)	Existing Land of 2011 (acres)	Land Requirement for 2021 (acres)	Additional Requirement for 2021	Land Requirement for 2031 (acres)	Additional Requirement for 2031
Residential						
General Residential	1.00 acre/ 100 pop.	592.21	306.72	-	345.24	-
Administration						
Upazila Complex	15 acres/ Upazila HQ	11.11	15.00	3.89	15.00	3.89
Paurashava Office	3 acres/ Upazila HQ	0.29	3.00	2.71	3.00	2.71
Commerce						
Wholesale Market	1.00 acre/ 10000 pop.	0.00	3.07	3.07	3.45	3.45
Retail sale Market	1.00 acre/1000 pop.	22.94	30.67	7.73	34.52	11.58
Neighborhood Market	1.00 acre/ Neighborhood market	0.00	4.00	4.00	4.00	4.00
Super Market	1.50 acres/ super market	0.00	1.50	1.50	1.50	1.50

Facilities	Standard (LGED)	Existing Land of 2011 (acres)	Land Requirement for 2021 (acres)	Additional Requirement for 2021	Land Requirement for 2031 (acres)	Additional Requirement for 2031
Industry	1.50 acres/ 1000 pop.	10.59	46.01	35.42	51.79	41.19
Education						
Primary School	2.00 acres/ 5000 pop.	5.63	12.27	6.64	13.81	8.18
Secondary School	5.00 acres/ 20000 pop.	8.35	7.67	-	8.63	0.28
College	10.00 acres/ 20000 pop.	9.10	15.34	6.24	17.26	8.16
Vocational Institute	5.00 acres/upazila	0.69	5.00	4.31	5.00	4.31
Others (Madrasa)	5.00 acres/ 20000 pop.	2.20	7.67	5.47	8.63	6.43
Health Facilities						
Upazila Health Complex/ Hospital	10 acres/ Upazila HQ	6.04	10.00	3.96	10.00	3.96
Health Center/ Maternity Clinic	1.00 acre/ 5000 pop.	1.38	6.13	4.76	6.90	5.53
Open Space/ Recreation						
Playground	3.00 acres/ 20000 pop.	0.25	4.60	4.35	5.18	4.93
Park/ Open space	1.00 acre/ 1000 pop.	0.33	30.67	30.35	34.52	34.20
Neighborhood Park	1.00 acre/ 1000 pop.	0.00	30.67	30.67	34.52	34.52
Stadium	7 acres/upazila HQ	0.00	7.00	7.00	7.00	7.00
Cinema	0.5 acre/ 20000 pop.	0.48	0.77	0.29	0.86	0.39
Community Facilities						
Mosque/ Temple/ Church	0.50 acre/ 20000 pop.	6.38	0.77	-	0.86	-
Eidgah	0.50 acre/ 20000 pop.	0.72	0.77	0.05	0.86	0.15
Graveyard	1.00 acre/ 20000 pop.	3.60	1.53	-	1.73	-
Community Center	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Police Station	3 acres/ Upazila HQ	2.01	3.00	0.99	3.00	0.99
Fire Service Station	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Post Office	0.50 acre/ 20000 pop.	0.13	0.77	0.64	0.86	0.73
Utility Services						
Telephone/ Telegraph Exchange	0.50 acre/ 20000 pop.	0.82	0.77	-	0.86	0.04
Electric sub-station	1.00 acre/ 20000 pop.	1.88	1.53	-	1.73	-
Water Supply	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Gas	1.00 acre/ 20000 pop.	0.00	1.53	1.53	1.73	1.73
Garbage Disposal	5.00 acre/ upazila	0.00	10.00	10.00	10.00	10.00
Waste Transfer Station	0.25 acre/waste transfer Station	0.00	0.75	0.75	0.75	0.75

Facilities	Standard (LGED)	Existing Land of 2011 (acres)	Land Requirement for 2021 (acres)	Additional Requirement for 2021	Land Requirement for 2031 (acres)	Additional Requirement for 2031
Transportation Services						
Bus Terminal	1.00 acre/ 20000 pop.	2.63	1.53	-	1.73	-
Truck Terminal	0.50 acre/ 20000 pop.	0.00	0.77	0.77	0.86	0.86
Tempo Stand	0.25 acre/ 20000 pop.	0.00	0.75	0.75	0.75	0.75
Rickshaw Stand	0.25 acre/ 20000 pop.	0.00	0.38	0.38	0.43	0.43
Roads	15% of the built-up land	61.67	113.64	51.97	113.64	51.97
Urban Deferred	10% of the total built-up area	0.00	75.76	75.76	75.76	75.76

12.6.3 Summary showing distribution of land for existing and proposed land uses

Residential Land Use

The existing total acreage under residential use has been found to be 592.21 acres. Residential uses are mostly concentrated on central part of Paurashava area. The projected population of the Paurashava is expected to be 30672 in the year 2021 and 34524 in the year 2031. The net density of population is at present 46 persons/acre which is very low compared to the planning standard. If the current trend of population continues, the projected net density is anticipated as 52 persons/acre in the year 2021 and 58 persons/acre in 2031 which is sufficient enough to meet the future housing requirements based on planning standard. So it is found that no additional land is required for residential development. The increasing demand of land for residential development is recommended to be met by the densification of existing areas through vertical development and compact township concept to ensure the optimum use of land.

According to the planning standards of UTIDP provided by LGED, the density of population (net density) is recommended to be 100 persons/acre for general residential use. The projected residential land is 306.72 for 2021 and 345.24 for 2031 which is lower than the existing residential land. The existing residential area is proposed to be splited into two distinct types of residential uses e.g. Urban Residential Zone (341.187 acre) and Rural Settlement (202.447 acre). A considerable amount of residential zone (28.904 acres) has been designated as mixed use where some other compatible activities (e.g. light commercial, light industrial) are observed and expected to continue. A Resettlement Zone is proposed beside Satntro Ebtadai Madrasha at Murarikathi mouza in ward 8 which contains 7.97 acres of land.

Commercial Land Use

The commercial activities have been occupied 22.944 acres of land in the project area, which is insufficient covering only about 0.62 percent of the total land. Considering planning standards and projected population it is notified that 39.24 acres of land is required for commercial development. It includes wholesale market, retail sale market, corner shops, neighborhood market that will accelerate trade and commerce of the Paurashava.

Due to scarcity of land in the built-up part, it was not possible to follow the standard; total 26.104 acres of land has been newly proposed in addition to the existing commercial land. 4 nos of Neighborhood markets comprising 3.87 acres of land, 1 (one) wholesale market of 4.887 acres land, one Slaughter House of 0.816 acres of land and 2 (two) Super Markets of 1.332 acres land is proposed as commercial land use.

Water body

The third highest land use category is water body. In all 325.24 acres of land are covered by water bodies which represents about 10.43 percent of the project area. Water bodies include river, ponds, ditches, beel and khals. Major water bodies of the area are the ponds and ditches which are distributed scatteredly all over the project area. The existing water bodies, which have an area more than 0.15 acres is proposed to be retained for functioning of water body as detention pond of storm runoff and thereby mitigation of rainfall induced flood vulnerability.

Agricultural Land Use

The major portion of land of the project area is under agricultural use. Total land under agricultural use is 2479.169 acres which is 67.36 percent of the land. Ward Nos.1, 2, 3, 4, 5, 6 and 7 rank high in terms of agricultural use of land. These areas have distinct rural character. Agricultural land of 2189.296 acres, which is 59.55 percent of the total land, is proposed to continue the current agricultural trend and the remaining land is proposed to be shifted in industrial/manufacturing, commercial, service or some other non-agricultural uses.

Urban Deferred

There is no land in the Paurashava which can be termed as urban deferred. Agricultural land having potentiality for development comprising 70.014 acres of land which is nearly 10% of built-up area as per standard has been proposed. Urban deferred land is proposed for the provision of urban development in future.

Circulation Network

Circulation Network occupies 1.68 percent land of the project area. Total area under this use amounts to 61.661 acres. The main circulation network is road. The projected area for circulation network use is estimated as 113.64 acre, which is nearly 15% of the total built-up area. The projected area of circulation network was not followed properly in the provision of land allocation for circulation network. The proposed use of circulation network is 295.785 acres of land. The reason behind this anomaly is that in practice more roads have been proposed to ensure connectivity and accessibility among the localities.

Education and Research Land Use

Educational Facility occupied 0.69 percent of the project area that covered 25.530 acres of land. Educational Institutions were generally Kindergarten, Government and Non-Government Primary School, High Schools, College, Madrasha, Computer Training Institute, Tutorial Coaching Center etc. The proposed area for education and research land use is 28.818 acres comprising of about 0.78% land of the total project area.

Industrial Land Use

Manufacturing and Processing land use occupies 10.594 acres of land and which is only 0.29 percent of the total land of the project area. Rice mils are the main industry of Kalaroa Paurashava which covers almost full part of this category. As per standard (1.50acres/ 1000 population), 46.01 acres of land is required for industrial activity. An industrial zone of additional 52.236 acres of land comprising general and heavy industry is proposed for advancement of industrial activity and generation of employment opportunity for the Paurashava inhabitants.

Transportation Facilities

A total of 4.91 acres of land are occupied by Transportation facilities. For provision of transportation facilities including truck terminal and rickshaw/van/tempo stand, passengers' shed, ghat, helipad, filling station, CNG station, mobile tower/transmission center, railway station a total of 6.393 acres of land is proposed for such type of facilities.

Open Space (Outdoor Recreation)

The existing land under open space, designated as urban green space at the survey stage, is 4.414 acres covering 0.12 percent of the total area. 41.416 acres of land is proposed for outdoor recreation to serve the projected population up to year 2021 reserving open land with a view to sustain hydrological processes as well as. It includes central park, Neighborhood Park beside Betraboti River and other outdoor recreational facilities.

Recreational Use (Indoor Recreation)

Presently there are two cinema halls in the Paurashava area with 0.48 acres of land which may be considered as sufficient enough to meet the requirement of such purpose. According to planning standard, further 0.29 acres of land is projected for future use up to year 2031. However, no further area is proposed for this use.

Health Services

Presently 7.42 acres of land is used for Health services in the Paurashava. According to planning standard, total 16.13 acres of land is projected for future use up to year 2031. However, the Doctor's residential areas are not counted in health services landuse according to landuse category provided the PMO. So, Upazila HQ have sufficient land to support the Paurashava. Furthermore, two hospitals are proposed within the Paurashava with 1.001 acres of land.

Utility Services

The existing land under utility services is 2.70 acre, which is not sufficient. According to planning standard, total 16.12 acres of land is projected for future use up to year 2031. Total 8.244 acres of land is proposed for Utility services to serve the projected population up to year 2031. It includes public toilets, fire service station, waste disposal ground and waste transfer stations.

Community Facilities

Currently 6.376 acres of land is used as community facilities. According to planning standard, total 9.90 acres of land is projected for future use up to year 2031. Total 8.513

acres of land is proposed for Utility services to serve the projected population up to year 2031. It includes community center, Eidgah and graveyard.

12.6.4 An estimate on the requirement of land for different uses

The requirement of land for different uses were estimated based on Planning Standards for UTIDP provided by the PMO Office of LGED and the projected population for up to the year 2031. The forecasted areas for each specific use were calculated through spreadsheet analysis (Microsoft Excel 2007) Software and further summarized into category wise land requirement for the 2021 and 2031, which was presented in **Table-12.2**.

12.7 Land Use Proposals

12.7.1 Introduction

The land use proposals are the result of the goals, land use analysis, and policies set forth in this document. Land suitability analysis defined which areas may be more suitable for each specific development. The urban growth areas delineate which areas are planned for future urban development. The recommendations of land use plans are generally followed within the urban growth areas. Other areas of potential residential, commercial, or industrial development are designated in key locations.

Mixed use, such as commercial and residential either shared within the same building or in close proximity, may become more common. The composition of development is largely determined by the market forces of supply and demand. The Paurashava has many acres of open, undeveloped land, and all future development will be dependent on this supply of developable land. Land supply is restricted by the ability to provide utilities and transportation services.

12.7.2 Designation of Future Land Use

Future Land Use is proposed for the next 20 years up to 2031 i.e. within the time frame of Urban Area Plan. The specific future land uses for Kalaroa Paurashava Town will be at least 49 different types which can be shown in Table-12.3 above. The proposed specific land uses were designated based on public consultation meeting with the stakeholders and land suitability analysis which is shown in **Table-12.3** (Proposed Specific Land Use) below. After that proposed general land use map was prepared and the details are shown in **Table-12.4** (Proposed general Land Use) and **Map-12.3** (Land Use Plan Map) below. Detailed plot schedule of General Land Use has been listed in **Appendix-B**.

Table 25.3: **Proposed Specific Landuse**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
CP	Central Park	Beside Cold Store Road	Ward 3	8.102	Jhikra_60_01	352, 392-395, 397-413, 415-417, 425-429, 1172, 1173
					Jhikra_60_02	1436, 1437, 1440, 1441, 1444-1456, 1460, 1461
FSS	Fire Service Station	Beside Jessore-Satkhira Road,	Ward 6	1.693	Gopinathpur_61_02	770-775, 778, 845

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
		near power house				
Hos-01	Hospital	Beside Jessore-Satkhira Road	Ward 6	0.462	Gopinathpur_61_01	65-68
Hos-02	Hospital	Beside Mirzapur Road	Ward 9	0.539	Mirzapur_69_00	544, 581
HS	High School	Beside Betraboti river in Morarikathi	Ward 7	3.811	Murarikathi_62_03	5064-5076, 5081-5083, 5085, 5107, 6733, 6735, 6736, 6739
IZ	Industrial Zone	Beside Jessore-Satkhira Road in Jhikra	Ward 5, 6	52.236	Gopinathpur_61_01	160, 182, 183, 1268
					Gopinathpur_61_02	216-231, 239-261, 263-284, 292-301, 304, 1276, 1278, 1279
					Jhikra_60_01	1092, 1114-1129, 1185, 1186, 1188
					Jhikra_60_03	2535, 2541-2544, 2547-2560, 2562-2565, 2569-2574, 2578-2599, 2637, 2689-2695, 2727-2730
LIH	Low Income Housing	Near Jessore-Satkhira Road in Tulshidanga	Ward 1	12.466	Tulshidanga_59_01	275-277, 305-310, 319, 327-341, 358, 359, 492, 493, 495-516, 546, 895
NM-01	Neighborhood Market	Near Tulshidanga Mondir	Ward 2	1.059	Tulshidanga_59_02	1383, 1385, 1386, 1392, 1395-1410, 1413-1416, 1419
NM-02	Neighborhood Market	Beside Shuvo Das Tample at Gopinathpur	Ward 6	0.845	Gopinathpur_61_02	957, 958
NM-03	Neighborhood Market	Beside Awami League Party Office at Murarikathi	Ward 7	1.294	Murarikathi_62_02	2088, 2157, 2160-2162, 2164, 2375
NM-04	Neighborhood Market	Beside Mirzapur Road	Ward 9	0.668	Mirzapur_69_00	544, 578-581
NP-01	Neighborhood Park	Beside Mosjid-E-Uusman Al-solaiman	Ward 2	1.273	Tulshidanga_59_02	1216-1222
NP-02	Neighborhood Park	Near Jessore-Satkhira Road in Murarikathi	Ward 6	0.866	Gopinathpur_61_02	980, 984, 985
NP-03	Neighborhood Park	Beside Sri potipurModel Govt. Primary School	Ward 8	1.038	Murarikathi_62_01	88, 90, 94-100
NP-04	Neighborhood Park	Beside Awami League Party Office at Murarikathi	Ward 8	1.460	Murarikathi_62_02	2040, 2042, 2043, 2079, 2080, 2085-2087, 4331
PA	Parking Area	Near Kalarowa GKMK Pilot High School	Ward 3	2.002	Jhikra_60_01	459-463
PS	Primary School	Near Jessore-Satkhira Road in Gopinathpur	Ward 6	0.995	Gopinathpur_61_02	862, 866-868, 871
PT-01	Public Toilet	Beside Bus Terminal	Ward 1	0.026	Tulshidanga_59_01	298

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
PT-02	Public Toilet	Beside Upazila Complex Park	Ward 1	0.014	Tulshidanga_59_02	1717
PT-03	Public Toilet	Beside Betraboti river at Bazaar area	Ward 2	0.029	Jhikra_60_01	64
PT-04	Public Toilet	Grameen bank at Bazaar area	Ward 3	0.017	Jhikra_60_01	234
PT-05	Public Toilet	Near Cold Store Road at Jhikra	Ward 3	0.016	Jhikra_60_01	432
PT-06	Public Toilet	Beside Betraboti river at Gopinathpur	Ward 6	0.013	Gopinathpur_61_02	959
PT-07	Public Toilet	In Morarikathi Road	Ward 7	0.027	Murarikathi_62_02	2388
PT-08	Public Toilet	Near Sapla Cinema Hall	Ward 8	0.016	Murarikathi_62_01	25
RZ	Resettlement Zone	Beside Satntro Ebtadai Madrasha at Morarikathi	Ward 8	7.966	Murarikathi_62_01	392-395, 398-404, 406, 408-414, 416-422, 424-429, 432, 433, 1070, 1072
SH	Slaughter House	Beside Fish market	Ward 2	0.816	Jhikra_60_01	109, 110, 112, 114
SM-01	Super Market	Beside ASA Office	Ward 1	0.850	Tulshidanga_59_02	1674, 1675, 1677-1680
SM-02	Super Market	Near Kalarowa GKMK Pilot High School	Ward 3	0.482	Jhikra_60_01	248, 269, 273
St	Stadium	Near Jhikra Reg. Primary School	Ward 5	6.639	Jhikra_60_01	857, 929-936, 986-999, 1008, 1026-1030
TS-01	Tempo Stand	Beside Tulshidanga Pashchimpara Jame Mosque	Ward 1	0.258	Tulshidanga_59_01	702, 704
TS-02	Tempo Stand	Beside Jessore-Satkhira Road	Ward 6	0.292	Gopinathpur_61_01	71, 75, 133
TS-03	Tempo Stand	Beside Sree Patipur Sarak	Ward 9	0.308	Mirzapur_69_00	205, 206
TT	Truck Terminal	Near Shake Aman Ullha Degree College	Ward 1	0.975	Tulshidanga_59_01	277, 281, 282
VI	Vocational Institute	Beside Rucia Bekari	Ward 4	0.749	Jhikra_60_01	715, 717-721, 723
WC-01	Ward Center	Beside Medical Road	Ward 1	0.386	Tulshidanga_59_01	867-870
WC-02	Ward Center	Beside Kolshidanga Kali Mondir	Ward 2	0.182	Tulshidanga_59_02	1766, 1767
WC-03	Ward Center	Near Cold Store Road	Ward 3	0.511	Jhikra_60_01	428, 430-433, 442, 443
WC-04	Ward Center	Near BRAC school at Jhikra	Ward 4	0.502	Jhikra_60_01	760, 761
					Jhikra_60_02	1839
WC-05	Ward Center	Near Jhikra Reg. Primary School	Ward 5	0.445	Jhikra_60_01	937-940, 943, 944
WC-06	Ward Center	Near Shuvo Das Tample	Ward 6	0.387	Gopinathpur_61_02	961-963
WC-07	Ward Center	Near Awami League Party	Ward 7	0.816	Murarikathi_62_02	2088-2091, 2155-2157

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
		Office				
WC-08	Ward Center	Beside BRAC school at Murarikathi	Ward 8	0.361	Murarikathi_62_01	234, 235, 239, 240
WC-09	Ward Center	Near Mirzapur West Para Jame Mosque	Ward 9	0.405	Mirzapur_69_00	144-146
WDG	Waste Disposal Ground	North corner of the Paurashava	Ward 2	5.679	Tulshidanga_59_02	1029-1036, 1038-1041
WM	Wholesale Market	Beside Jessore-Satkhira Road and Shake Aman Ullha Degree College	Ward 2	4.887	Tulshidanga_59_02	1185, 1266, 1271-1281, 1283-1288
WTS-01	Waste Transfer Station	In Jhikra, near the core area	Ward 3	0.131	Jhikra_60_01	456, 458, 459, 461
WTS-02	Waste Transfer Station	In Murarikathi	Ward 7	0.263	Murarikathi_62_02	2213-2215
WTS-03	Waste Transfer Station	In Mirzapur	Ward 9	0.221	Mirzapur_69_00	263-266

Table 25.4: **Proposed General Land Use**

Sl. No.	Landuse Type	Remarks	Area (acre)	Percentage (%)
01	Agricultural Zone	Agricultural land denotes the land suitable for agricultural production, both crops and livestock.	2189.296	59.55
02	Circulation Network	Road and Rail communication	295.785	8.05
03	Commercial Zone	The land used for commercial activities is considered as commercial land use. Commercial land includes established markets and areas earmarked for markets.	26.104	0.71
04	Community Facilities	All community facilities including funeral places and other religious uses	9.116	0.25
05	Education & Research Zone	All kinds of educational institutes	28.818	0.78
06	General Industrial Zone	Green and Orange A categories as per The Environment Conservation Rules, 1997	34.791	0.95
07	Government Office	All Government Offices	10.508	0.29
08	Health Services	All Hospitals, clinics and diagnostic center	7.626	0.21
09	Heavy Industrial Zone	Other toxic and pollutions Industries (Orange B and Red categories as per the Environment Conservation Rules, 1997)	26.389	0.72
10	Miscellaneous	Any other categories, which are not related to other 23 categories	21.791	0.59
11	Mixed Use Zone	Mixed land use refers to the area without a dominant land use or, multiuse	28.904	0.79
12	Open Space	Playground, Botanical Garden, Stadium, Zoo etc.	41.416	1.13
13	Recreational Facilities	Indoor based facilities with designated building structure i.e. Cinema Hall, Theater Hall etc.	0.713	0.02
14	Restricted Area	Where no one but certain people can enter, i.e. Electric Sub-Station, Fuel Reserve Depot, Gas	1.659	0.05

Sl. No.	Landuse Type	Remarks	Area (acre)	Percentage (%)
		Transmission, Cantonment etc.		
15	Rural Settlement	Rural settlement includes the low dense residential area, which is scattered and rural in nature.	202.447	5.51
16	Transportation Facilities	This category includes airport, bus terminal/ stand, ferry ghat, filling station, garage, launch terminal, post office, passenger shed, telephone exchange, ticket counter, transport office etc.	6.393	0.17
17	Urban Deferred	Urban reserved area for future development	70.014	1.90
18	Urban Residential Zone	It includes high dense residential area	341.187	9.28
19	Utility Services	Utility services include Overhead Tank, Power Office/Control Room, Public Toilet, Sewerage Office, Waste Disposal, Fire Service, Water Pump House, Water Reservoir, Water Treatment Plant etc.	8.244	0.22
20	Beach	Sea Beach	0	0.00
21	Forest	Designated Forest Area	0	0.00
22	Overlay Zone	Undefined Zone	0	0.00
23	Historical & Heritage Site	The entire mentionable historical and heritage site	0	0.00
24	Water Body	Equal or More than 0.15 acre and justification by the consultant and wet land will merge with water body	325.248	8.85
Grand Total			**3676.448**	**100.00**

Map 25.3: Land Use Plan for Kalaroa Paurashava

12.7.3 Land use Zoning

Zoning is a device of land use planning used by local governments in most developed countries. The word is derived from the practice of designating permitted uses of land based on mapped zones which separate one set of land uses from another. Zoning may be use-based (regulating the uses to which land may be put), or it may regulate building height, lot coverage, and similar characteristics, or some combination of these. Combinations of zoning designations can also be applied to the same area.

Zoning is the process of planning for land use by an executing agency/Paurashava to allocate certain kinds of structures in certain areas. Zoning also includes restrictions in different zoning areas such as, a) height of buildings, b) density (number of structures in a certain area), c) use of lots, green space etc. According to these above criteria following 3 (three) types of zoning regulations can be exercised in the land use planning.

a) Height Zoning

The height zoning provides height limits for structures and objects of natural growth and standards for use of an area, which encourage and promote the proper and sound development of areas. It is also applicable to height restrictions for flight safety around airports or other similar purposes.

Maximum allowable height of buildings is determined based on relation between ground cover of buildings and the land parcel that house it, minimum setback of building from the adjoining plot boundaries and the maximum floor area that can be constructed in relation to plot size and the connecting road.

As there is no airport/ Helipad in the Paurashava vicinity and population density is very low compared to the built-up cities and towns, there should not be any height limit of buildings for Kalaroa Paurashava. However, in order to ensure habitable urban environment maximum allowable height should be determined based on setback, building bulk, allowable FAR (Floor Area Ratio) and width of the adjacent road.

b) Density Zoning/ Bulk Zoning

Density Zoning can be defined as the zoning ordinances that restrict the average number of houses per acre that may be built within a particular area, generally in a subdivision. Density based zoning assigns a total permissible number of residential units that may be built on any given parcel of land using a base density plus environmental criteria to establish the numbers of residential units the land can reasonably accommodate.

Bulk zoning regulations restrict the density in a given area through a variety of building-specific measures, including floor-area-ratio (FAR), setback requirements, and open space requirements. Such provisions are separate from use-based zoning regulations, which restrict the type of use permitted in a given area, such as residential, industrial, or commercial.

Kalaroa Paurashava is an Upazila level agro-based town where rural homesteads are prevalent and most of the houses are katcha and semi-pucca. Density Zoning/Bulk zoning regulation is not applicable for this town with low population density and scattered development.

c) Use Zoning

The primary purpose of use zoning is to segregate uses that are thought to be incompatible. In practice, this zoning is used to prevent new development from interfering with existing residents or businesses and to preserve the "character" of a community.
The list of permitted, conditionally permitted and restricted uses in different zones have been illustrated in **Appendix-A**.

12.8 Plan Implementation Strategy

12.8.1 Land Development Regulations to implement the Land use Plan

Effective implementation of a plan is the most important part of the planning process. This chapter highlights various measures needed to be taken in order to implement the land use plan proposals.

Implementation of the Land use Plan depends on successful pursuit of the policies specified in the Structure Plan. Those policies represent a significant challenge face with the responsibility of planning and managing the development of the Paurashava area. However, at present no authority is responsible for planning and managing physical development activities in the Paurashava and no regulation except Local Government (Paurashava) Act, 2009 for controlling physical development. This poses a serious constraint to the implementation of the Land use Plan and in fact, any development plans.

Prior to introduction of the regulations, to implement the land use plan Legislative involvement is recommended here:

1. Impose control on all type of buildings in the Paurashava according to the setback rules prescribed in the Building Construction (Amendment) Rules, 1996 (Notification No. S.R.O. No. 112-L/96). Building permission for extended areas shall be according to the land use provision prescribed in the plan. Any permission for building construction, front road width shall not be less than 16 ft. and the construction must follow the Building Construction (Amendment) Rules, 1996.
2. To control the air, water, noise and soil pollution, Conservation of Environment and Pollution Control Act, 1995 (Act No. I of 1995) was enacted. In the Paurashava, there is no authority for enforcing the provisions prescribed in the said Act. The pollution related with the implementation of land use component may be controlled with this Act.
3. Haphazard development of commercial activities is the general scenario of the Paurashava. It is necessary to impose control on commercial activities provisioned in the Shops and Establishments Act, 1965 (Act No. VII of 1965).
4. In case of man-made canal, regulations prescribed in the Canal and Drainage Act, 1873 (Act no. VIII of 1873) is the best weapon. For the linking of canal with others and river considering drainage facilities the Act may be enforced.
5. For the conservation of archeological monuments or structures or historical development the Ancient Monuments Preservation Act, 1904 (Act no. VII of 1904) may be enforced. Archeological Department of Bangladesh and Paurashava authority through a partnership process may preserve such type of development.

6. To control air pollution due to brick burning with the establishment of brick field, Brick Burning Control Ordinance, 1989 (Ordinance No. VIII of 1989) is the appropriate regulation. The Paurashava authority may enforce this Ordinance with the authorization given by the government to him.
7. To control the medical practitioner, establishment of private clinics and pathological laboratories, the statute named Medical Practice, Private Clinics and Laboratories (Regulation) Ordinance, 1982 (Ordinance No. IV of 1982) was enacted. For efficient enforcement of the Ordinance, the Paurashava authority' may execute the Ordinance with the authorization of government.
8. The Paurashava will have to exercise strictly Playfield, Open space, Garden and Natural Tank in Urban Areas Preservation Act, 2000 (Act No. XXX VI of 2000) to some specially important areas like, riverfront and water bodies, drainage channels, low land below certain level, designated open space, etc. Development restrictions are needed around security and key point installations. The provision of restriction will strengthen the power of the plan to safeguard its development proposals and landuse provisions.
9. The government is authorized for establishment of hat and bazar with the acquisition of land through the statute named Hat and Bazar (Establishment and Acquisition) Ordinance, 1959 (No. XIX of 1959). In case of private hat and bazar, a management body is being empowered through the Bangladesh Hats and Bazars (Management) Order, 1973 (P.O. 73/72). The Paurashava authority is also empowered establishing hat and bazar in his jurisdiction through the Local Government (Paurashava) Act, 2009. Coordination may be framed among the government (Upazila Parishad), Paurashava and private owner for the establishment, development and management of the hat and bazar located in the Paurashava premises.
10. In the Paurashava premises, industrial development is controlled by the Bangladesh Cottage Industries Corporation through Bangladesh Cottage Industries Corporation Act, 1973 (Act No. XXVIII of 1973), Industrial Development Corporation through East Pakistan Industrial Development Corporation Rules, 1965 (No. EPIDC/ 2A-2/63/354) and Factory Inspector through Factories Act, 1965 (Act No. IV of 1965). Locational aspects and issuing of trade license is controlled by the Paurashava authority. A joint coordination cell among those four authorities may control the establishment of factories and industries in the Paurashava.
11. In the Paurashava, for rain water harvesting, some specific ponds / tanks will needed to be preserved. A number of derelict tanks may be improved through tank improvement project and in this case Tanks improvement Act, 1939 (Act No. XV of 1939) will support the Paurashava is regulatory aspects.
12. Except Khas land, a considerable amount of public land in the Paurashava may be identified as fallow land or unproductive land. In regulatory term those lands are considered as culturable waste land and those lands are being fallow during five consecutive years. Those lands may be utilized under the guidance of Culturable Waste Land (Utilization) Ordinance, 1959 (Ordinance No. E.P. XIII of 1959).

12.8.2 Implementation, Monitoring and Evaluation of the Land Use Plan

The implementation, monitoring and evaluation strategies of Structure Plan have been illustrated in Chapter-9 of Part-A. The Land Use Plan should also be implemented, monitored and evaluated under the same strategy by strengthening capacity of the Paurashava and forming a Monitoring and Evaluation Committee (MEC).

As the Land Use Plan is a mid-term plan with a period of 10 years, it will be implemented on phase wise according to priority. The proposals have been prioritized based on the most urgent community needs, since the Government of Bangladesh is a least developed country and it has a very limited budget on infrastructure development. Besides, the Paurashava Authority itself is not capable of financing this huge cost.

The land use Plan will be implemented gradually following prioritized landuse proposals. Phasing of land use proposals was done based on the priority needs for development of the town. The Phase-I of the land use proposals, to be also incorporated in the Ward Action Plan, will be implemented within first 5 year (2011-2016) of the land use plan period. The consultants have proposed Phase-II of the proposals to be implemented within next 5 years following the recent past Ward Action Plan. The details of phasing are shown in **Table-12.5**. After each 5 years the Land Use Plan will be evaluated, updated and new Ward Action Plan will be formulated under the changing circumstances.

Table 25.5: **Phasing of Specific Land Use Proposals**

Phase-I (2011-2021)			Phase-II (2021-2031)		
ID	**Use**	**Location**	**ID**	**Use**	**Location**
FSS	Fire Service Station	Beside Jessore-Satkhira Road, near power house	CP	Central Park	Beside Cold Store Road
Hos-01	Hospital	Beside Jessore-Satkhira Road	Hos-02	Hospital	Beside Mirzapur Road
NM-02	Neighborhood Market	Beside Shuvo Das Tample at Gopinathpur	HS	High School	Beside Betraboti river in Morarikathi
NP-01	Neighborhood Park	Beside Mosjid-E-Uusman Al-solaiman	IZ	Industrial Zone	Beside Jessore-Satkhira Road in Jhikra
NP-02	Neighborhood Park	Near Jessore-Satkhira Road in Murarikathi	LIH	Low Income Housing	Near Jessore-Satkhira Road in Tulshidanga
NP-03	Neighborhood Park	Beside Sri potipurModel Govt. Primary School	NM-01	Neighborhood Market	Near Tulshidanga Mondir
NP-04	Neighborhood Park	Beside Awami League Party Office at Murarikathi	NM-03	Neighborhood Market	Beside Awami League Party Office at Murarikathi
PA	Parking Area	Near Kalarowa GKMK Pilot High School	NM-04	Neighborhood Market	Beside Mirzapur Road
PT-01	Public Toilet	Beside Bus Terminal	PS	Primary School	Near Jessore-Satkhira Road in Gopinathpur
PT-02	Public Toilet	Beside Upazila Complex Park	RZ	Resettlement Zone	Beside Satntro Ebtadai Madrasha at Morarikathi
PT-03	Public Toilet	Beside Betraboti river at Bazaar area	SM-01	Super Market	Beside ASA Office
PT-04	Public Toilet	Grameen bank at Bazaar area	St	Stadium	Near Jhikra Reg. Primary School
PT-05	Public Toilet	Near Cold Store	TS-01	Tempo Stand	Beside Tulshidanga

Phase-I (2011-2021)			Phase-II (2021-2031)		
ID	**Use**	**Location**	**ID**	**Use**	**Location**
		Road at Jhikra			Pashchimpara Jame Mosque
PT-06	Public Toilet	Beside Betraboti river at Gopinathpur	TT	Truck Terminal	Near Shake Aman Ullha Degree College
PT-07	Public Toilet	In Morarikathi Road	WC-01	Ward Center	Beside Medical Road
PT-08	Public Toilet	Near Sapla Cinema Hall	WC-02	Ward Center	Beside Kolshidanga Kali Mondir
SH	Slaughter House	Beside Fish market	WC-03	Ward Center	Near Cold Store Road
SM-02	Super Market	Near Kalarowa GKMK Pilot High School	WC-04	Ward Center	Near BRAC school at Jhikra
TS-02	Tempo Stand	Beside Jessore-Satkhira Road	WC-05	Ward Center	Near Jhikra Reg. Primary School
TS-03	Tempo Stand	Beside Sree Patipur Sarak	WC-06	Ward Center	Near Shuvo Das Tample
VI	Vocational Institute	Beside Rucia Bekari	WC-07	Ward Center	Near Awami League Party Office
WTS-01	Waste Transfer Station	In Jhikra, near the core area	WC-08	Ward Center	Beside BRAC school at Murarikathi
WTS-02	Waste Transfer Station	In Murarikathi	WC-09	Ward Center	Near Mirzapur West Para Jame Mosque
WTS-03	Waste Transfer Station	In Mirzapur	WDG	Waste Disposal Ground	North corner of the Paurashava

Monitoring is a very important part of plan implementation. Monitoring helps check if the plan is being implemented properly. It also measures the level of implementation of the plan. If the plan implementation is not on track, corrective measures can be taken to put execution on the track. Thus the Plan should be monitored by the MEC for proper implementation of the Plan. The MEC should call for a meeting at least two times a year on regular basis. In addition, it should sit for a meeting in any situation if any dispute arises regarding implementation of the Plan. After expiry of any plan evaluation will be made about the errors and omissions. Such evaluation will help to take corrective measures in the next plan.

Chapter 13

Transportation and Traffic Management Plan

13.1 Introduction

13.1.1 Introduction

Transportation and Traffic Management Plan is an advanced document that sets out the long-term direction for transport in a particular area. The plan guides development of a town's transportation system. It covers the movement of people by mode, for example, public transport, car, walking and cycling, and freight by road, railway and waterway as appropriate to an area.

It is useful for defining the direction of transport-related issues in a particular area. It can recognize the links between transport and land use and urban form and set objectives and policies to address these linkages.

The Kalaroa Paurashava connects Jessore district head quarter and Satkhira district head quarter by road way. Most of the offices are located in the middle part of the Paurashava, whereas the educational institutions are scatteredly distributed all over the Paurashava. All markets and shopping centers are placed along the road sides.

The project area is served by 91.30 kilometers of roads. Out of the total length of roads 9.17 km are pucca, 42.57 km are semi-pucca and 39.56 km are Katcha.

There are two major intersections known as Upazila Mor and Posurhat mor. Those intersections are connects with several important Roads within the jurisdiction of the Paurashava. Food grain such as rice are continuously transporting by truck towards Dhaka regularly.

Rickshaw, Electric Rickshaw and Rickshaw Van are the main mode of transport within the jurisdiction of the Paurashava. Bhodvodi is a locally made motorized vehicle are another mode of transport, those are being using passenger into the heart from long distance.

13.1.2 Approach and Methodology

The methodology of the study could be illustrated through five-step process for the assessment of Transportation and Traffic Management Plan. These five steps are:

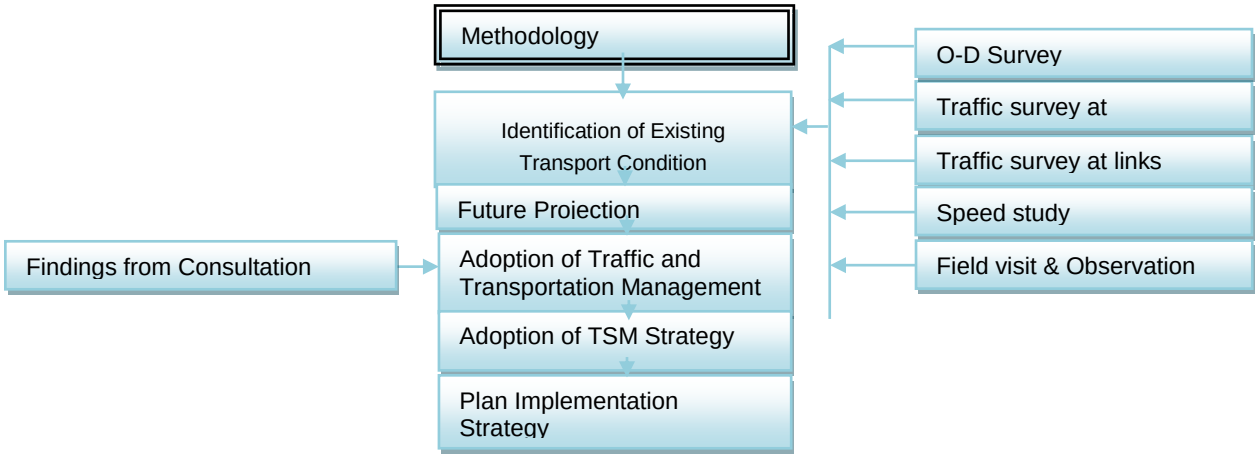

Figure 27.1: Flow Chart of the Methodology

The first step of the methodology of transportation and traffic management plan is to identify the existing transport condition, which is the result of O-D survey, traffic survey at intersection, traffic survey at links and speed study; have already described in the survey report. In the next step, the future projection of transportation network and traffic demand is identified, which is described in the interim report. The third phase of the study is to adopt new traffic and transportation management plan, which is prepared based on future projection. After that, some strategies on transportation system management (TSM) are undertaken. Finally, plan implementation strategies are espoused based on both transportation management plan and transportation system management.

13.2 Existing Conditions of Transportation Facilities

13.2.1 Roadway Characteristics and Functional Classification

The road hierarchy of Kalaroa Paurashava is limited to Feeder Road Type-A (District Roads), Feeder Road Type-B and Rural Roads (Category R1, R2 & R3) only. There is no National or Regional Highways in this Paurashava. According to the Rural Infrastructure Strategy Study '96 of World Bank & Planning Commission the Road hierarchy of Bangladesh is categorized as illustrated in **Table 13.1**.

Table 27.1: **Road hierarchy in Bangladesh**

Seq.	Category	Definition
1.	National Highway (NH)	Connecting national capital with divisional head quarters, old district headquarters, port cities and international highways;
2.	Regional Highway (RH)	Connecting different regions with each other, which are not connected by the national highways;
3.	Feeder Road Type-A (FRA)	Connecting Thana headquarters to the arterial network;
4.	Feeder Road Type-B (FRB)	Connecting growth centers to the RHD network (FRA or arterial road) or to the Thana Headquarters;
5.	Rural Road Class 1 (R1)	Connecting union headquarters/local markets with the Thana headquarters or road system.
6.	Rural Road Class 2 (R2)	Connecting villages and farms to local markets/union headquarters.
7.	Rural Road Class 3 (R3)	Roads within villages.

Source: Rural Infrastructure Strategy Study, 1996

There are as many as three types of roads are existed in Kalaroa Paurashava which is Pucca, Semi-Pucca and Katcha. The Pucca roads are usually the paved bituminous roads, Semi-Pucca roads are mostly the Herring Bone Bond (HBB) type, and the Katcha roads are usually earthen roads. A list of some major roads of functional importance in the regional transport network has been given in **Table-13.2** below:

Table 27.2: **Inventory of Some Major Roads at Kalaroa Paurashava**

Sl. No.	Name of Major Roads	Road Hierarchy	Width (m)	Total Length (km)	Road Type
01.	Jessore-Satkhira Road	Feeder Road Type-A	6.1	6.31	Pucca
02.	Medical Road	Rural Road Class 1 (R1)	3.05	1.23	Pucca
03.	Cold Store Road	Rural Road Class 1 (R1)	3.05	1.65	Pucca

Source: Traffic and Transport Survey by DDC, 2009

13.2.2 Traffic Pattern

The traffic pattern of Kalaroa Paurashava is characterized by only road transport which is available among all the transport modes prevailing in other towns and cities all over Bangladesh. Both vehicular and pedestrian traffic is observed to ply over the town. The types of vehicular traffic generally found in that mode are:

Motorized Traffic Non-Motorized Traffic

Car/Jeep	Truck	Cycle Rickshaw
Bus	Nosimon	Rickshaw van
Micro-bus	Auto-rickshaw/tempo	Animal/push cart and
Mini-bus	Motor cycle	Bi-cycle

It was revealed from traffic volume survey that non-motorized traffic comprises 92.41% of the total volume and the remaining 7.59% is composed of motorized traffic. Thus Non-motorized traffic (NMT) should be considered as a major issue in formulating traffic and transportation management plan.

13.2.3 Intensity of Traffic Volume

In most important intersections, traffic surveys were conducted. Considering office time from 9:00 AM to 5:00 PM, intersection traffic flows were presented during morning peak hour 9:00-10:00 AM and evening peak hour 4:00-5:00 PM. The off-peak hour have been considered at 6.00-7.00 AM and 11.00-12.00 PM for lowest volume of traffic in the observed intersection. Upazila Mor and Posurhat Mor are the most important intersections of the Kalaroa Paurashava. Almost all mode of traffic is found at this intersection. The diagrams of these two intersections are illustrated in Figure-11.1 and 11.2.

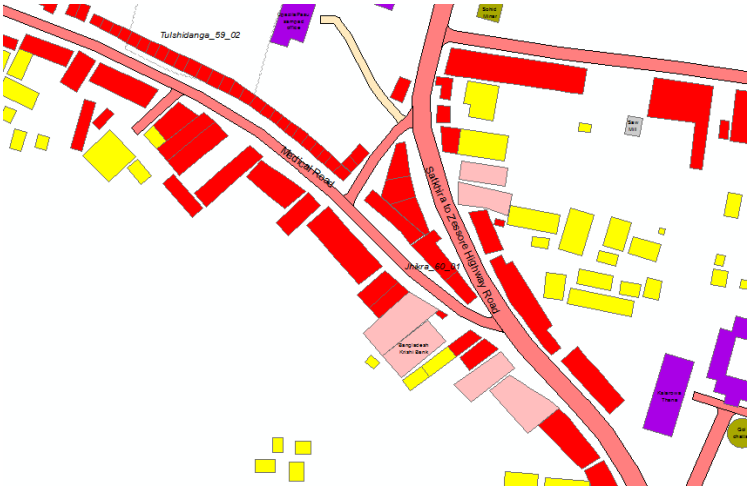

Figure 27.2: Flow Diagrams of Upazila Mor

Figure 27.3: Flow Diagrams of Posurhat mor

The peak hour and off-peak hour volume of motorized (MT) and non-motorized traffic at both intersections has been presented in **Table-13.3** below.

Table 27.3: Peak and Off-Peak Hour Traffic Volume at Major Intersections

Peak/Off-Peak	Day time	Duration	Traffic Volume			
			Upazila Mor		Posurhat mor	
			MT	NMT	MT	NMT
Peak	Morning	8:00 AM-10:00 AM	584.5	3038.74	226.5	4903.71
	Evening	3:00 PM-5:00 PM	531	3078.35	214.5	4633.57
Off-Peak	Morning	6:00 AM-8:00 AM	447.5	1952.31	67.5	2292.8
	Evening	6:00 PM-8:00 PM	413	1774.49	63	2150.34

Source: Traffic and Transport Survey by DDC, 2009

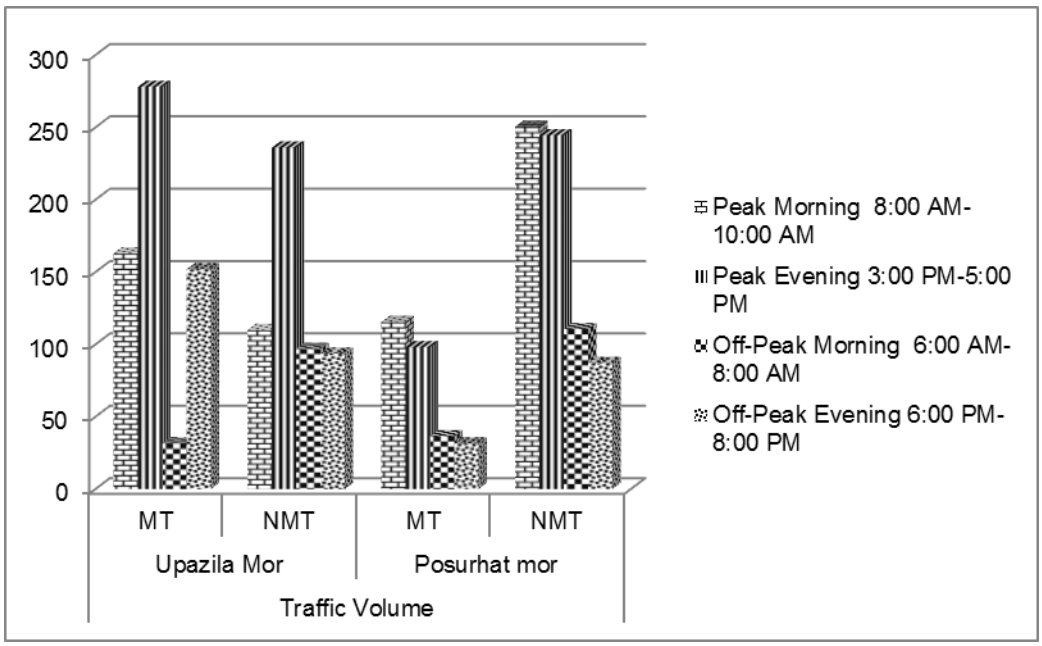

Figure 27.4: Composition of Peak/Off-Peak Traffic Volume at two Intersections

13.2.4 Level of Service: Degree of Traffic Congestion and Delay

Level of Service (also called Quality of Service or Service Quality) refers to the speed, convenience, comfort and security of transportation facilities and services as experienced by users. Level-Of-Service (LOS) ratings, typically from A (best) to F (worst), are widely used in transport Planning to evaluate problems and potential solutions. Because they are easy to understand, Level-Of-Service rating often influences transport planning decisions. Such ratings systems can be used identify problems, establish performance indicators and targets, evaluate potential solutions, compare locations, and track trends.

Level of service (LOS) is a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure. LOS is most commonly used to analyze highways by categorizing traffic flow with corresponding safe driving conditions.

From Kalaroa through main roads are Jessore-Satkhira Road, Cold Store Road, Medical Road and Sree Patipur Road. Traffic generation centers are mostly Bazar area, Upazila Complex, Bus Terminal, Police Station, Different Educational Institutions, Different Markets, Katcha Bazars, Hospitals, Land Office and Different Govt. Offices.

The bazaar area, Upazila Mor and Posurhat mor are the most congested areas in Kalaroa Paurashava. The entire area from Upazila Mor to Posurhat mor can be considered as congested areas.

There are various methods of determining LOS of road links and intersections, e.g., average vehicle control delay method (for intersection), speed-based method, vehicle capacity ratio (v/c) method. The Level of Service measure is much more suited to American Roads than roads in Europe and Asian countries like Bangladesh where Speed ranges of Level of Service (LOS) categories of urban streets are not well defined for highly heterogeneous traffic flow condition on urban streets in Indian context. Moreover, it requires more relevant, accurate and specific data on speed, delay, traffic volume, capacity of roadway link derived from detailed engineering survey. For an upazila level small town like Kalaroa, where Non-motorized traffic comprises about eighty percent volume, assessment of Level of Service (LOS) is not requisite in the formulation of Traffic and Transportation Management Plan.

13.2.5 Facilities for Pedestrians

Most of the public generally considers pedestrian facilities to be limited to sidewalks; however, they encompass a much broader scope of services and facilities. Pedestrian facilities include, but are not limited to, traffic control devices, curb ramps, grade separations (overpasses and underpasses), crosswalks, and design features intended to encourage pedestrian travel (such as traffic calming devices including speed bumps or center refuge islands). In general, these facilities parallel the roadway system and provided as part of the public right-of-way. Pedestrian facilities or “pedestrian lanes” provide people with space to travel within the public right-of way that separated from roadway vehicles. It improves mobility for pedestrians and provides access and an alternative means of travel to and from home, work, parks, schools, shopping areas, and transit stops. It also provides places for children to walk, run, skate, bike, and play, where no walkways are provided, or where walkways are in poor repair or have missing sections. It is obligatory to mention here that, at present there is no pedestrian facilities available at Kalaroa Paurashava.

13.2.6 Analysis of Existing Deficiencies

Like any other upazila town, Kalaroa has also transportation deficiencies, which are identified from two different sources. Firstly, by reconnaissance survey of the town, field observation interview of passenger and operator and secondly, by means of household sample survey.

13.2.6.1 Roadway capacity Deficiencies

Narrow Road Width

Narrow widths of roads and poor maintenance have been marked as major transport problems in the town. It causes higher traffic volume exceeding roadway capacity and creates serious traffic congestion on the narrow streets. There is little chance that the authority will be able increase the road width in highly built up areas, especially in the crossing point of main bazaar area, as there will be high cost involvement and social-pressure on any attempt to demolition will be very high.

Traffic congestion due to narrow width of roads has been identified as one of the challenging issues regarding the resolution of transport problem. Most of roads have been constructed without maintaining the minimum standard of road width. A list of some functionally important narrow roads has been provided in **Table-13.4** below.

Table 27.4: **List of Narrow Roads**

Sl. No.	Road Name	Road Hierarchy	Avg. Width (m)	Length (km)	Type
01	Medical Road	Rural Road Class 1	3.05	1.23	Pucca
02	Cold Store Road	Rural Road Class 1	3.05	1.65	Pucca
03	Sree Patipur Road	Rural Road Class 1	3.22	1.08	Pucca
04	Shonabaria Road	Rural Road Class 3	2.44	0.762	Pucca

Traffic Conflict

Traffic conflict is common and frequent in towns where there is admixture of transport vehicles – slow and fast – in the streets. Areas of conflict occur at point where the intensity of traffic movement is high. The consultant studied the traffic movement in all over the town and identified two main points where the traffic conflict is highest. These are Upazila Mor (intersection) and Posurhat mor. At these points the slow moving vehicles, like, rickshaw and vans come in conflict with motor vehicles, creating traffic congestion. As the slow moving vehicles are higher, the conflict is usually frequent.

The identified reasons for traffic conflict are improper intersection design, parking of vehicles on the street, waiting of operators on the roads looking for possible passengers, absence of traffic signal, disobedience of traffic rules etc.

13.2.6.2 Operational Safety, Signal and other Deficiencies

Like any other upazila town, which is beyond the regional and national movement directly, Kalaroa Paurashava has no traffic management system. There is no traffic point and traffic islands including road dividers, no signal posts. That is why operational and road safety is not existed.

13.2.7 Condition of other mode of transport (Rail/Water/Air)

Kalaroa Paurashava is not connected with any kinds of Railway network.

River Betraboti have not enough navigibility. So, there is no prospect of water transportation within this Paurashava.

There is no air transport facility in Kalaroa, for air travelling the people of Kalaroa depending upon the Capital City Dhaka or Jessore.

Map 27.1: Existing Road Network of Kalaroa Paurashava

13.3 Future Projections

13.3.1 Travel Demand Forecasting for Next 10 Years

Travel demand occurs as a result of thousands of individual travelers making individual decisions on how, where and when to travel. These decisions are affected by many factors such as family situations, characteristics of the person making the trip, and the choices (destination, route and mode) available for the trip.

Before forecasts are made of travel, it is necessary to determine how the community will look in the future. Transportation is directly linked to land use. Trips are assumed to follow future land use patterns. If land use is changed, there should be a change in travel.

The travel forecasting process is at the heart of urban transportation planning. This process is used to estimate the number of trips that will be made on a transportation systems alternative at some future date. Many assumptions need to be made about how people make decisions, the factors they consider and how they react a particular transportation alternative.

Travel demand is expressed as the number of persons or vehicles per unit of time that can be expected to travel on a given segment of a transportation system under a set of given land-use, socioeconomic, and environmental conditions.

Three factors affect the demand for urban travel:

- Location and intensity of land use
- Socioeconomic characteristics of people living in the area; and
- Extent, cost, and quality of available transportation services

Land use characteristics are a primary determinant of travel demand. The amount of traffic generated by a parcel of land depends on how the land is used, for example, shopping centers, residential complexes, and office buildings produce different traffic generation patterns. Socioeconomic characteristics of the people also influence the demand for transportation. Lifestyles and values affect how people use their resources for transportation, for example, a residential area consisting of high-income workers will generate more trips by automobile per person than a residential area populated primarily by low-income workers.

The availability of transportation facilities and services, referred to as the supply, also affects the demand for travel. Travelers are sensitive to the level of service provided by alternative transportation modes, when deciding whether to travel at all or which mode to use they consider attributes such as travel time, cost, convenience, comfort, and safety. To extrapolate the transport demand, it was necessary to accumulate data on Employment, vehicle ownership, trip distribution, etc. Though some categories of data mentioned above have been collected by Socio-economic Survey, yet these data sets are scanty to enable forecast of future travel demand.

Furthermore, the traffic survey for the UTIDP was conducted to get the overall picture of traffic pattern in the study area and this survey is not detail enough to allow extrapolation of traffic. That is why; the consultants have some limitations to adopt any traffic model to forecast future traffic demand. The complexities of traffic in the study area, as per common observation are assumed to be insignificant. However, prior to maintaining proper planning standard, the Paurashava is yet capable of regulating the traffic. Nevertheless, the recommended planning standards of road are the followings (Table 13.5):

Table 27.5: **Recommended Planning Standard**

Road Type	Right of Way (ROW)
a) Primary Road	60 feet, 80 feet, 100 feet, 120 feet
b) Secondary Road	40 feet
c) Tertiary	30 feet
c) Local Road	20 feet

Source: UTIDP Planning Standard, LGED

However, a little bit of jamming concentration has been observed in some major roads of the Paurashava. Generally, the concentration of traffic reaches to its peak during 9:00 am-10:00 and 4:00 pm-5:00 pm. Moreover, it is also observed that most of the major roads of Kalaroa Paurashava are below 6.10 meter in width, which is assumed to be a potential threat to accommodate the future traffic. Therefore, the road capacity needs to be improved as per the UTIDP planning standard of LGED.

13.3.2 Transportation Network Considered

The growth of transport networks obviously affects the social and economic activities that an area can support; yet the dynamics of how such growth occurs is one of the least understood areas in transport, geography, and planning. Transport network changes are treated exclusively as the result of top-down decision-making. Changes to the transport network are rather the result of numerous small decisions (and some large ones) by property owners, firms, developers, towns, cities, counters, and MPOs in response to market conditions and policy initiatives. Understanding how markets and policies translate into facilities on the ground is essential for scientific understanding and improving forecasting, planning, policymaking, and evaluation.

13.3.3 Future Traffic Volume and Level of Service

Traffic volume, as indicated by traffic counts at various locations on the roadway network; which reflect current travel patterns and how well the network is serving the travel demand.

When planning ahead to address the needs of our transportation network, it is important to project the level of traffic that we can anticipate during our planning period and beyond. Population growth plays a key role in determining the needs of a transportation system. Generally, an increase in population results in an increase in the use of transportation facilities; which in most cases means more vehicles on the roadways.

The two intersections are Upazila Mor and Posurhat mor are the most important intersections of the Kalaroa Paurashava. The intensity of traffic movement observed in Upazila Mor and Posurhat mor is high and traffic conflict is prevalent at these points.

The Level of Service (LOS) represents the minimum acceptable performance standards on a particular roadway facility. The Paurashava authority should have adopted the policy LOS for their road system. The key factors in the policy of Level of Service (LOS) consider the following:

- The individual characteristics of the community, its goals, objectives and needs
- The ability to provide the facilities that are determined necessary to maintain the policy level of service for current and future traffic volumes
- The ability to fund the facilities that are determined necessary to maintain the policy level of service for current and future traffic volumes

13.4 Transportation Development plan

13.4.1 Plan for Road Network Developemnt

13.4.1.1 Road Network Plan

Planning standard is a fundamental tool for formulation of any planning perspective including transport plan. The suggested planning standards of road width for UTIDP are illustrated in Table-13.5. The standards are meant for use by UTIDP, LGED and other planning and development agencies. The consultants to draw up the current series of plans have adopted the standards. An integrated road network plan has been prepared commensurating the planning standards and considering the convenient movement of all vehicular and pedestrian traffic. Three types of road, such as Paurashava Primary Road, Secondary Road and Local Road are proposed designating a unique ID No. to each road for identifying them in map. The road network plan along with transportation management plan is presented in **Map 13.2** below.

13.4.2 Summary of Road Network Plan

Total 79.69 km of road development has been proposed in Kalaroa Paurashava. Total 32.18 km road will be newly constructed and 46.28 km road will be widening up to the planning period 2031. Length of the local road will be 14.89 km and RoW of these roads will be 20 ft which covers 16.89% of total road network development proposal. Total length of secondary road will be 18.84 km and RoW of these roads will be 40ft for this ward. The rest road will be developed as primary road and its RoW will be 60-120 ft. The detailed scenario of road network development proposal is given in Table 13.6. In the following paragraph more detail scenarios of different are given.

Table 27.6: Summary of Road Network Plan of Kalaroa Paurashava

Width in Ft	Type of Road	Total		New Road		Road Widening	
		Length(km)	%	Length(km)	%	Length(km)	%
20 ft	Local Road	14.89	16.89	12.50	32.17	2.39	5.07
30 ft	Tertiary Road	22.54	29.10	2.44	11.69	20.10	42.57
40 ft	Secondary Road	18.84	21.79	3.67	11.71	13.97	29.58
60 ft	Primary Road	8.35	11.09	0.00	0.00	8.35	19.66
80 ft	Primary Road	3.33	6.24	1.86	10.27	1.47	3.11
100 ft	Primary Road	7.62	7.31	7.62	16.76	0.00	0.00
120 ft	Primary Road	4.09	7.59	4.09	17.41	0.00	0.00
Total		**79.69**	**100.00**	**32.18**	**100.00**	**46.28**	**100.00**

Paurashava Primary Road

Satkhira-Kalaroa road will be developed as primary road for Kalaroa Paurashava. Total length of primary road is 23.40 km with 60 ft, 80 ft, 100 ft and 120 ft RoW. Figure 13.5 shows the layout design of primary road with 80ft RoW.

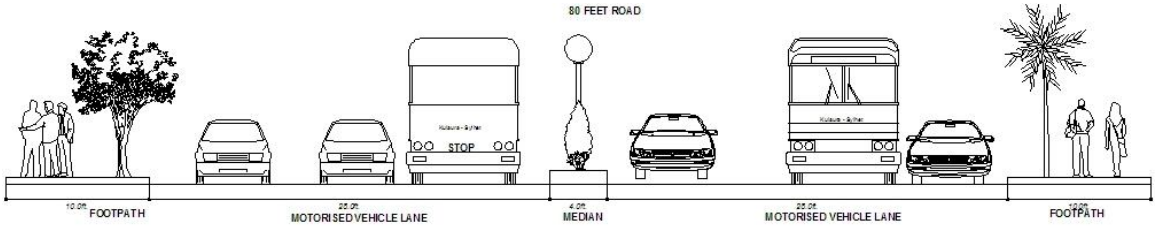

Figure 27.5: Primary Road with 80 ft RoW

Paurashava Secondary Road

Total proposed secondary road is 18.84 km with 40 ft RoW. Figure 13.6 shows the layout design of secondary road with 40 ft RoW.

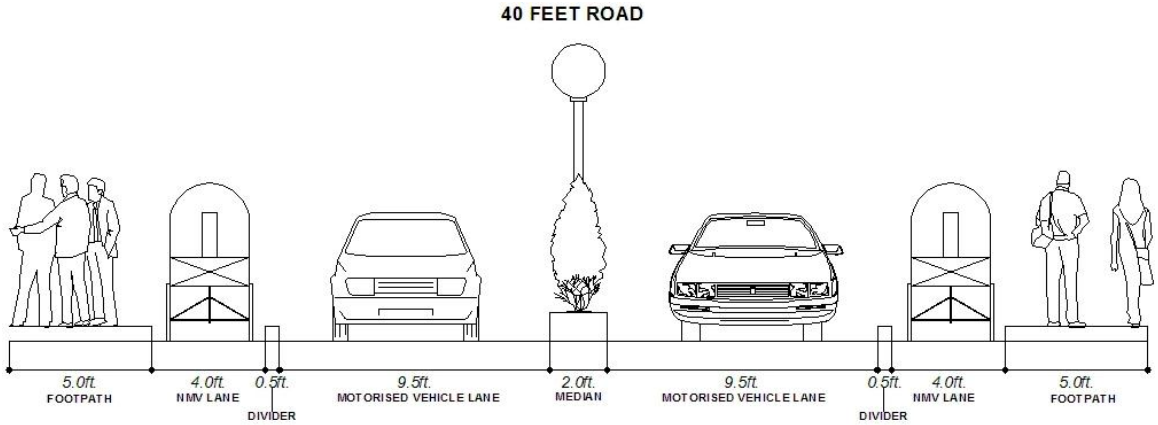

Figure 27.6: Secondary Road with 40 ft RoW

Tertiary Road

Total local road is 22.54 km with 30 ft RoW, which covers 29.10% of total road network plan of Kalaroa Paurashava. Figure 13.7 shows the layout design of local road with 30 ft RoW for Kalaroa Paurashava.

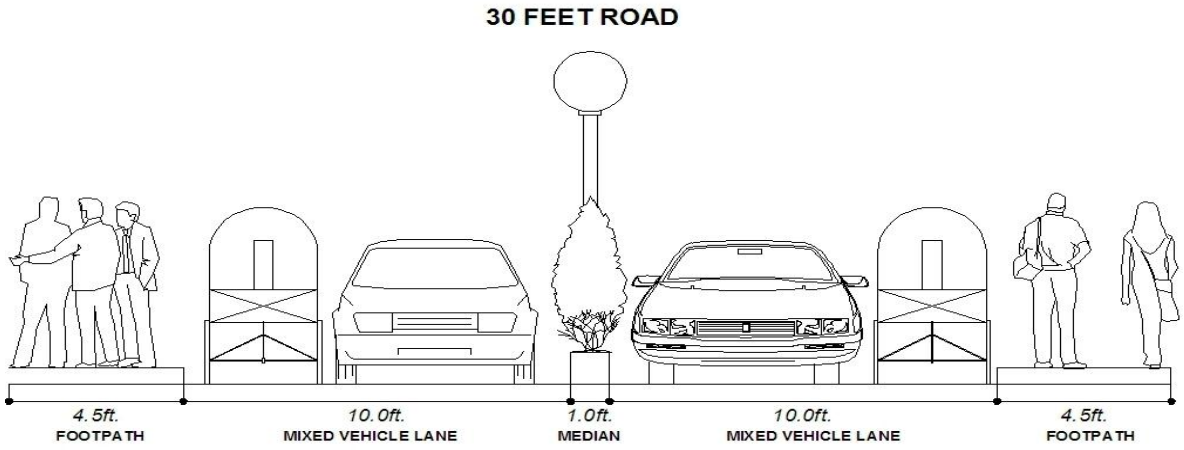

Figure 27.7: Tertiary Road with 30 ft RoW

13.4.2.1 Proposal for improvement of the existing road networks

Traffic management measures may be adopted to increase traffic capacity and safety. The improvement could be done by removing the deficiencies in the existing core road network by widening and/or strengthening of selected stretches/ corridors in a phased manner and improvement of road geometrics and safety provisions. The proposals for widening of roads existing roads are listed in tabular form (**Table: 13.7**) below:

Table 27.7: **Summary of road widening proposal at Kalaroa Paurashava**

Width in Ft	Type of Road	Road Widening	
		Length(km)	%
20 ft	Local Road	2.39	5.07
30 ft	Tertiary Road	20.10	42.57
40 ft	Secondary Road	13.97	29.58
60 ft	Primary Road	8.35	19.66
80 ft	Primary Road	1.47	3.11
Total		**46.28**	**100.00**

13.4.2.2 List of Proposed new roads

The Urban Area Plan provides brief description of any proposed transport improvements. The transport content of this plan has been developed around the framework of the Structure Plan. The specific transport proposals set out in the Urban Area Plan for public consideration include new road schemes and improvements, traffic management measures, the co-ordination of public transport services, the control of car and lorry parking and the improvement of cyclist and pedestrian safety. The proposals put forward for discussion to the mass people of the Paurashava. The Paurashava authority also advises about road development should not be duplicated in the public examination of Urban Area Plan and Ward Action Plans. Local Authority roads, which are not strategic, are not included in the Ward Action Plan and both the need for the road and the line of the route are matters for the Urban Area Plan to consider. A summary of proposed of new roads have been made after studying the existing road network, travel demand pattern, potential for future urban growth and conducting public consultation meeting with Paurashava officials, councilors, local people and other stakeholders which is presented in **Table 13.8**.

Table 27.8: Summary of Proposed New Roads in the Project Area

Width in Ft	Type of Road	New Road	
		Length(km)	%
20 ft	Local Road	12.50	32.17
30 ft	Tertiary Road	2.44	11.69
40 ft	Secondary Road	3.67	11.71
60 ft	Primary Road	0.00	0.00
80 ft	Primary Road	1.86	10.27
100 ft	Primary Road	7.62	16.76
120 ft	Primary Road	4.09	17.41
Total		**32.18**	**32.18**

Map 27.2: Road Network Plan for Kalaroa Paurashava

13.4.3 Plan for Transportation Facilities

13.4.3.1Transportation Facilities Plan

Truck Terminal

A truck terminal is proposed to the Near Kalarowa GKMK Pilot High School, Proposed Primary road (PR-01). As per standard of UTIDP the required area of Truck Terminal for the projected population of 30672 up to year 2031 is about 0.77 acre. An area of 0.975 acres is proposed for the truck terminal. It comprises Plot No. 277, 281, 282 of Tulshidanga Mouza. The location and outline of the proposed truck terminal is shown in **Map 13.3**. The details are given in **Table 13.9**.

Table 27.9: **List of Proposed Transport Facilities**

ID	Name of Facilities	Location	Ward No.	Area (acre)	Mouza Schedule
PA	Parking Area	Near Kalarowa GKMK Pilot High School	Ward 3	2.002	Mouza- Jhikra Plot No. 459-463
TS-1	Tempo Stand	Beside Tulshidanga Pashchimpara Jame Mosque	Ward 1	0.258	Mouza- Tulshidanga Plot No. 702, 704
TS-2	Tempo Stand	Beside Jessore-Satkhira Road	Ward 6	0.292	Mouza- Gopinathpur Plot No. 71, 75, 133
TS-3	Tempo Stand	Beside Sree Patipur Sarak	Ward 9	0.308	Mouza- Mirzapur Plot No. 205, 206
TT	Truck Terminal	Near Shake Aman Ullha Degree College	Ward 1	0.975	Mouza- Tulshidanga Plot No. 277, 281, 282

Tempo Stand

Tempo is now a major and cheap commuter in small towns that play important role in commuter transportation. There is no formal tempo stand in the Paurashava. Thus, three tempo stands (with unique ID TS-1, TS-2 and TS-3) along with rickshaw/van stand are proposed in Ward-1 (Beside Tulshidanga Pashchimpara Jame Mosque), Ward-6 (Beside Jessore-Satkhira Road) and Ward-9 (Beside Sree Patipur Sarak). The location and outline of the proposed tempo stand/rickshaw stand is shown in **Map-13.3**. As per standard of UTIDP the required area of this facility is about 0.25 acre/one tempo stand. Proposed area of TS-1, TS-2 and TS-3 are 0.258, 0.292 and 0.308 acre respectively.

Bus Stop

A bus stop is a designated place where buses stop for passengers to board or leave them. These are normally positioned on the highway. The construction of bus stops tends to reflect the level of usage. Only Inter-Upazila bus movement pattern is observed to ply over the Paurashava and no town service is existed in this area. Through traffic is highly discouraged to pass over the central part of the Paurashava. For the movement of Inter-Upazila bus and other through traffic, an alternative option is proposed; where four secondary roads will act as by-pass road and channelize the traffic movement without interrupting the bazar area. Every bus will stand at the proposed bus terminal to pick the passengers.

13.4.3.2 Parking and Terminal Facilities

There is no parking facilities provided in Kalaroa Paurashava. People are habituated for parking beside the roads. This parking practice occupied considerable spaces and

reduces the effective road width. Particularly in bazaar area where a number of markets exist the parking problem become acute during weekly hat days. If it is possible to integrate parking area for tempo, rickshaw, van, etc. near to bazar area the congestion problem will be solved.

In order to mitigate the traffic congestion and traffic conflict at the bazar area a parking area is proposed (**Map 13.3**). 2.002 acres of land Near Kalarowa GKMK Pilot High School has been proposed as Parking Area adjacent to Kalaroa Bazar area. On-street parking shall be prohibited on all roads within the bazar area except at places where it is specifically permitted for parking.

Adequate terminal facilities will be provided at the bus and truck terminal for the convenience and comfort of the commuters.

The bus terminal should have to accommodate the following services:

- Ticket Counter
- Passenger-shed
- Workshop
- Cleaning and washing facility
- Loading and unloading place
- Bus parking space
- Toilet facility
- Waiting room

The following facilities are proposed to accommodate in the truck terminal complex:

- Workshop
- Cleaning and washing
- Loading and unloading yard
- Truck parking space
- Toilet facility

13.4.3.3 Development of Facilities for Pedestrians, Bicycles and Rickshaws

Footpath may refer to sidewalk, which runs along vehicular roads. It is a separate lane exclusively designed for the purpose of pedestrian movement. The footpath is quite safe and free from any accident. Unfortunately, there is no footpath besides any road of Kalaroa Paurashava.

The transportation system within residential neighborhoods should favor pedestrian movement and discourage vehicular through traffic in both new and existing neighborhoods. A pedestrian system that utilizes neighborhood streets and paths to link the residents with the commercial and school functions serving the area will be encouraged. Pedestrian ways (Footpath) will be provied with all the proposed major roads of the Paurashava.

The provision of separate bicycle or rickshaw lane is not a requisite for a low level of traffic movement pattern, which is prevalent in any upazila level small town like Kalaroa Paurashava.

Map 27.3: Transportation Facilities Map of Kalaroa Paurashava

13.4.3.4 Other Transportation Facilities

Roundabout

A roundabout is a type of circular intersection. Well-designed roundabouts are a safe, effective form of junction. They can handle much higher volumes of turning traffic. Their safety benefits result primarily from the control they exercise on approach speeds, and this makes them ideal for junctions at the entrance to towns and villages. They are also one of the safest ways of handling the transition between dual carriageways and single carriageways.

The presence of mixed traffic, including NMVs and pedestrians, means that roundabouts must be designed primarily for speed control. Roundabout will be proposed in all the major intersections.

Central Divider

Central divider will be proposed in the primary and secondary roads of the Paurashava with a view to avoid conflict between both-way movements of vehicular traffic on same road.

Traffic Signs and Signals

Traffic signs and signals are required in order to provide for the safe and orderly movement of motorized and non-motorized traffic and pedestrians. These provide information about routes, directions, destinations and points of interest. They also provide information on regulations, which apply to specific locations or at specific times, and warn of hazards, which may not be evident.

When a traffic sign is correctly used, the majority of motorists will comply with the posted regulation or warning, and drive in a safe and orderly manner. In order to minimize the rate of traffic conflict the following signs and signals should be provided at the key location considering the prevailing traffic situation and traffic management option.

- ✓ Warning signs
- ✓ Regulatory signs
- ✓ Speed limit signs
- ✓ Bus and cycle signs and road markings
- ✓ On-street parking control signs
- ✓ Road markings
- ✓ Motorway signs and signals
- ✓ Direction signs on all-purpose roads
- ✓ Information signs
- ✓ Traffic signals
- ✓ Zebra crossings
- ✓ Signs for road works and temporary situations

13.4.4 Waterway Development/ Improvement Options

Betraboti River has not enough navigability for water transportation. Therefore, waterway development or improvement option is not suggested for Kalaroa Paurashava.

13.4.5 Railway Development Option

There is no Railway network available in the Kalaroa Paurashava area. But, no further development options are proposed for Kalaroa Paurashava.

13.5 Transportation System Management Strategy (TSM)

The strategy for street layouts must start with considering pedestrian movement rather than vehicular movement. This approach ensures greater consideration of pedestrians, cyclists and public transport users. In many instances, all users can comfortably share the same street network.

13.5.1 Strategies for Facility Operations

- Direct walking and cycling routes to local facilities such as shops, schools, public transport, and open spaces, together with lighting and landscaping of such routes
- The planting of appropriate street plantation
- Protect environment and improve health by building and investing in public transport and other types of efficient and sustainable transport which minimize emissions and consumption of resources and energy
- Strict vigilance should be in force in order that no one can cut the earth from the embankment and shoulders of the road and nothing is done to cause harm to the embankment and shoulders
- The people should be motivated to give up the use of the iron rim for the tractor, and wooden frame for the cartwheel drawn by cows or buffaloes - instead they should be encouraged to use rubber wheels
- People should be encouraged not to overload the bus and additionally, they should also be informed about the hazards of trucks loaded beyond their carrying capacity to dissuade them from such practices
- Care should be taken to dissuade people from digging irrigation canals on the shoulder or slope

13.5.2 Strategies for Traffic Flow and Safety

- Links to the overall road network in the town, including bus services, based on an analysis of the need for such linkages
- Maximum accessibility for pedestrians and cyclists
- Circulation routes for public transport within the area
- Consideration of provision for low design speeds (such as 30 kph) and facilities for pedestrians and cyclists
- Automated traffic signals to improve traffic flow and road safety
- Introduction of temporary signs to provide information to road users to enable safe and convenient travel
- Restricting movement of heavy vehicle though the residential zone during specific periods
- Provision for prescribed shoulder on either side of the road
- The roads should be kept free from all unauthorized obstructions. In this regard, all markets, shops, Billboards, utility lines such as telephone lines, street lights, electricity poles, gas connection lines etc. must be relocated

- Undesirable hump on the road, if exists, should be removed. In case of speed needs to be regulated, then the hump should be replaced by rumble strips
- Measures should be taken to prevent water stagnation of on the road surface
- Kilometer posts are put up on each road in accordance with the approved design, drawing and specification

13.5.3 Strategies for Traffic Management

Enhancements to enable more effective use and management of existing physical infrastructure. These enhancements typically include better road markings, signs, traffic signals, channelization at intersections, turn restrictions and separation barriers, space for bus stops, and parking or waiting areas for public transport vehicles

Initiatives to improve the ability of road users (motorists and pedestrians alike) to adopt behavioral patterns which lead to more efficient and safer transport services. Typically, this will involve programs to alter community attitudes and invoke a greater willingness to accept better discipline by all users and providers of the transport services

Improved testing and licensing procedures for all drivers and re-training for offending drivers. Since most drivers work for someone else, the influence that owners exert by either condoning or reinforcing poor driving habits or insisting and demanding good driving habits is substantial and should not be under estimated

Increased level of enforcement of traffic rules to ensure a greater compliance with community desired road user behavior. Enforcement actions can involve formal policing as well as informal pressure on individuals to adopt community norms of behavior and should include the involvement of community leaders

13.6 Plan Implementation Strategies

13.6.1 Regulations to implement the Transportation Plan

The Transportation Plan for Kalaroa Paurashava will be regulated and implemented by the Paurashava authority along with LGED and Roads & Highways Department. These authorities should exercise the following Ordinance, Rules and Policy to implement the transportation plan.

The Motor Vehicles Ordinance, 1983 can be exercised by the respective authorities to control and scrutinize the movement pattern of motorized traffic in Kalaroa Paurashava. It includes licensing of conductors of stage carriage or contract carriage, registration of motor vehicles, control of transport vehicles, construction, equipment and maintenance of motor vehicles, control of traffic, and insurance of motor vehicles against third party risks, offences, penalties and procedure.

The Motor vehicle rules, 1997 is designed to ensure the road safety, which can also be exercised by the authorities. The center of attention of these rules is design and specification of the length and height of motorized vehicles and repair of break down vehicles.

Another government’s policy for the transport sector is spelt out in the National Land Transport Policy approved in April 2004. The policy objectives include provision of safe and dependable transport services, and improving the regulatory and legal framework. The policy is designed to play an important role in helping reduce the transport costs of

goods for export and in keeping the costs of Bangladeshi goods competitive in the world market. The policy also introduces an integrated multimodal transport system, linking road, rail and water transport. Under the last government a draft Integrated Multimodal Transport Policy was prepared but has not yet been approved. It is designed to build upon the Land Transport Policy and help in achieving more rational and balanced investments across transport modes and achieve better coordination among them.

On the other hand, the Paurashava Authority should practice the 'Local Government (Paurashava) (Amended) Act, 2010' to ensure safe and sustainable transport service for the inhabitants.

The respective authorities will ensure 'Sustainable Transportation Management Plan' for Kalaroa Paurashava through exercising all of these rules, ordinance and policy frameworks.

13.6.2 Implementation, Monitoring, Evaluation and Coordination of the Plan

The implementation, monitoring and evaluation strategies of Structure Plan have been illustrated in Chapter-9 of Part-A. The Transportation and Traffic Management Plan should also be implemented, monitored and evaluated under the same strategy by strengthening capacity of the Paurashava and forming a Monitoring and Evaluation Committee (MEC).

As The Transportation and Traffic Management Plan is a mid-term plan with a period of 10 years, it will be implemented on phase wise according to priority. The proposals have been prioritized based on the most urgent transport needs, since Bangladesh is a least developed country and it has a very limited budget for infrastructure development. Besides, the Paurashava Authority itself is not capable of financing this huge cost.

The Transportation and Traffic Management Plan will be implemented gradually following prioritized transport proposals including roads, central divider, roundabout etc. Phasing of proposals was done based on the priority. The Phase-I of the proposals, to be also incorporated in the Ward Action Plan, will be implemented within first 5 year (2011-2016) of the plan period. The consultants have proposed Phase-II of the proposals to be implemented within next 5 years succeeding the recent past Ward Action Plan. After each 5 years the Plan will be evaluated, updated and new Ward Action Plan will be formulated under the changing circumstances.

Plan implementation strategy depends on Monitoring, evaluation and coordination of a plan. Monitoring checks the plan is being implemented properly or not. It also measures the level of implementation of the plan. If the plan implementation is not on track, corrective measures can be taken to put execution on the track. After expiry of any plan evaluation is made about the errors and omissions. Such evaluation helps take corrective measures in the next plan. Such monitoring and evaluation must be carried out from within the Paurashava. But Kalaroa Paurashava is not equipped with qualified manpower to make such evaluation. Monitoring and evaluation of a plan is essentially the responsibility of qualified and experienced planners. As there is no planner in Kalaroa Paurashava, the implementation, monitoring, evaluation and coordination phase of Transport Management Plan will be seriously affected. The Paurashava should have built its own capacity to ensure the 'Transportation Management Plan' properly.

Chapter 14

Drainage and Environmental Management Plan

This is the third Chapter of Part-B (Urban Area Plan) of the Final Master Plan for Kalaroa Paurashava, which comprises Drainage and Environmental Management Plan. This Chapter has been further subdivided into two parts titled under Part-I: Drainage Plan and Part-II: Environmental Management Plan.

The Drainage Plan has been formulated with the aim of reducing drainage congestion, water logging and urban flooding. This part seeks the options for retaining the natural drainage system as well as linking the surface drains (manmade drain) to the channel network and retention ponds. An integrated drainage network is the ultimate goal of this plan.

Part-II of this Chapter comprises Environmental Management Plan that has been formulated for ensuring a sustainable living and working environment for the Paurashava dwellers. This Part entails detailed plans and proposals for protection and conservation of natural and built environment including water bodies, ecology, flora and fauna etc. and pollution control in the light of policies and guidelines set in the structure plan.

PART - I: DRAINAGE PLAN

14.1 Introduction

The purpose of the Drainage Plan is to make an assessment of the present drainage facilities and the scope for future development within 14.878 square kilometer study area of the Kalaroa Paurashava that consists of partially developed commercial, residential area and infrastructure. The purpose of the survey was to gather information available and use them at the time of the preparation of the Drainage Plan that shall act as a guiding document for designing of drains in future. This Drainage Plan shall be a planning tool and shall be used as a guideline for Kalaroa Paurashava that shall be responsible for the approval of drainage improvements. In the past, the term drainage included only the hydrologic and hydraulic aspects for discharge of storm runoff. Perhaps the most pressing challenge that now a days we face include the management of our water resources and flood hazard, maintain a continuous supply of water for industrial, agricultural, transportation, recreation, and potable water for present and future generations. The Drainage Plan aspects shall also include the flood and water resources management and pollution abatement. The Drainage Plan will propose improvements necessary to the major drainage systems to accommodate storm runoff of the Kalaroa Paurashava. This planning process will consider both structural and nonstructural techniques to reduce the effect of the storm runoff which may be summarized as follows:

i) Improvements to major drainage outfalls

ii) Improvement of the drainage network

iii) Management of available water resources

iv) Conservation of existing natural drainage channels

14.1.1 Goals and Objectives

Following are the overall objectives of the drainage plan of Kalaroa Paurashava:

a. To allow smooth drainage of storm water and the waste water of the town.

b. To develop a comprehensive drainage network with area coverage and capacity.

c. To prevent encroachment to natural drainage system.

d. To create awareness about disposing of solid waste in the drainage system.

14.1.2 Methodology and Approach to Planning

Preparation of the Drainage Plan involves (I) analyzing the existing conditions related to drainage facilities and the flood management (II) identifying major drainage outfalls and on the basis of the outfalls splitting the total drainage area into a number of drainage zones (III) defining all pertinent design criteria and (IV) defining drainage facility requirements and sizing.

The drains are designed to collect excess rainfall that comes as surface runoff from urban area, convey the runoff and finally discharge them to outfalls. The design of drains involves hydrological computations of rainfall intensity, its frequency of occurrence, duration etc., and the total runoff of a particular catchment area. The US Soil Conservation Service (SCS) method shall be used as an alternative of the Modified Rational Method for larger catchment areas. In Modified Rational Method, the overall watershed is divided into zones that contribute to hydraulically significant points of concentration. The boundary of the zones is established based upon local topographic boundaries such as streets, existing drainage systems, etc., using good engineering practice.

14.2 Existing Drainage Network

14.2.1 Introduction

For the preparation of Drainage Plan, survey started through field reconnaissance and review of available document related to the study area. The Kalaroa Paurashava and its adjacent area have been visited several times to identify the sources of flooding, existing drainage pattern, flood flow pattern and geographical position of the study area. Field trips have also been carried out to identify the infrastructures, rivers, canals, beels, ponds etc., those required to be surveyed for preparation of maps. It is investigated whether any Drainage Plan has been prepared by any other agency. The Mayor of Kalaroa Paurashava informed that no such plan has been prepared earlier.

14.2.2 Existing Drainage System/ Network

14.2.2.1 Drainage Network Survey

The drainage system of Kalaroa Paurashava has been surveyed and classified into two categories: (i) unlined natural khals and man made canals act as primary drain and reservoir (ii) earthen shallow secondary drains and brick masonry secondary and tertiary

drains. There is one river situated within the Paurashava area, but there are three canals situated within the Paurashava area (Map 14.1).

Table 29.1: **List of River & Canal in the Study Area**

River/ Canal Name	Flow Direction	Length (km)	Area (acres)	Alignment
Betraboti River	Towards North-South	6.03	53.19	Boundary line Ward Nos. 2, 5, 6, 7, 8 & 9

Source: Field Survey, 2008-2010 by DDC

The secondary and tertiary drains are man made brick drains, surveyed and shown in the Map-14.1. These drains are constructed by Paurashava from their Annual Development Program fund. Within the Paurashava total 10.909 km drains so far constructed. The secondary and tertiary drains so far constructed in Paurashava are listed in **Table 14.2** below.

Table 29.2: **List of Secondary Drains in the Study Area**

No.	Drain ID	Type	Length (m)	Width (m)	Depth (m)	Ward No.
01	3	Pucca	323.50	1	1	1
02	1	Pucca	330.87	.5	1	8
03	4	Pucca	202.43	.5	1	2
04	11	Pucca	319.39	.5	1	2
05	27	Pucca	250.57	.5	.5	1
06	4	Pucca	334.89	.3	1	1, 2
07	21	Pucca	156.95	.3	1	2

Source: Field Survey, 2008-2010 by DDC

Map 29.1: Existing Drainage Network in Kalaroa Paurashava

14.2.3 Analysis on land level (Topography)

14.2.3.1 Land Levels/Spot Levels

The Total Station (TS) based surveys were conducted for measuring the spot levels/land levels of the project area (Northing, Easting, Elevation or RL). Later on these spot levels were used for generating the contour of the project area. In general the spot levels on the land were taken approx. at 10 meter intervals.

Total 54028 spot values were collected for the study area. A contour line/contour joins points of equal elevation (height) above mean sea level. A digital elevation map is a map illustrated which shows valleys and hills, and the steepness of slopes. The contour interval of a contour map is the difference in elevation between successive contour lines. The lowest spot height is 0.45 m PWD and the highest spot height is 6.28 m PWD. Around 52.2% of the spot heights are between 2.01 m to 3 m and average height of land of the surveyed area is 2.226 m PWD. Details statistical summary of land levels survey are shown in **Table-14.3** and **Table-14.4** below.

Table 29.3: **Spot Value and Spot Unit**

No.	Spot Unit	Value (meter)
01	Total Spot Number	54028
02	Average Spot Height	2.226
03	Maximum Height	6.2796
04	Minimum Height	0.4503
05	Variance	5.83
06	Standard Deviation	1.22

Source: Topographic Survey by DDC, 2008-2010

Table 29.4: **Spot Interval and Frequency**

No.	Spot Interval (mPWD)	Spot Number (Frequency)	Percentage (%)
01	0.01 – 1.00	16347	30.3
02	1.01 – 2.00	965	1.8
03	2.01 – 3.00	28224	52.2
04	3.01 – 4.00	6388	11.8
05	4.01 – 5.00	2077	3.8
06	5.01 – 6.00	23	0.01
07	6.01 – 7.00	4	0.001
Total	**-**	**54028**	**100.0**

Source: Topographic Survey by DDC, 2008-2010

14.2.3.2 General Contour Descriptions

Kalaroa Paurashava is a land of mixed topography. From the spot level readings having the x, y and z values being determinant for the study area, a digital elevation map (DEM) of the study area has been drawn. It was observed that except Ward Nos. 3 and 7 all Wards have found the highest elevation. The contour lines were generated without road spots to find out the exact view of elevation. Lowest elevation was found on natural features (Canal, Pond and Khal) in different Wards of the Paurashava. In preparing the map, the vertical interval of the contours was taken as 0.3m. Mauza wise variations of spot height are depicted in **Table-14.5**. Project area appears to be no exception as the present contour survey reveals.

Table 29.5: **Variation of Spot Height According to Ward**

Ward No.	0.1 to 1.0	1.1 to 2.0	2.1 to 3.0	3.1 to 4.0	4.1 to 5.0	5.1 to 6	Minimum	Maximum	Average
01	60	326	472	602	184	0	0.6	4.80	2.86
02	58	288	484	514	160	0	0.6	4.80	2.84
03	118	358	482	294	76	0	0.6	4.50	2.44
04	44	219	324	286	62	0	0.6	4.80	2.66
05	80	266	400	406	76	0	0.6	4.80	2.66
06	266	539	648	654	198	6	0.6	5.70	2.55
07	284	710	798	588	148	2	0.6	5.10	2.39
08	168	580	764	760	200	0	0.6	4.80	2.65
09	48	220	356	278	26	0	0.6	4.80	2.57
Total	**1126**	**3506**	**4728**	**4382**	**1130**	**8**	**-**	**-**	**-**

Source: Topographic Survey by DDC, 2008-2010

14.2.4 Analysis of peak runoff and identification of drainage outfalls

The size and shape of the catchments or sub-catchments for each drain shall be determined by plan meter from topographic maps and by field survey. In determining the total runoff of a catchment area the following assumptions to be made:

i) The peak rate of runoff at any point is a direct function of the average rainfall intensity for the Time of Concentration to that point.

a. The recurrence interval of the peak discharge is same as the recurrence interval of the average rainfall intensity.

b. The Time of Concentration is the time required for the runoff to become established and flow from the most distant point of the drainage area to the point of discharge.

Regarding runoff discharge, it has been observed that there is no river existed in the Kalaroa Paurashava. But, there are six canals within the Paurashava. That is the only natural drainage channels which receives part of the runoff volume from part of the town.

Map 29.2: Digital Elevation Map of Kalaroa Paurashava

14.3 Plan for Drainage Management and Flood Control

14.3.1 Plan for Drain Network Development

Sustainable drainage network system, an alternative to conventional drainage is introduced to mimic natural drainage, with the aim of reducing flooding and improving the quality of water draining from urban surfaces (runoff). A comprehensive drainage network is developed leaving the existing beels and ponds to remain their natural form. The entire Paurashava area is divided into several drainage zones based on topographic condition, natural and manmade drainage divides e.g. roads. There are only three small canals in the area. The marshlands and large ditches are proposed to be connected with the respective catchment area through manmade primary and secondary drains. These drains would receive runoff from other secondary and tertiary drains falling into them and from the land phase of the catchment area.

14.3.1.1 Drain Network Plan

Drainage network plan is intended primarily for flood mitigation, water logging and erosion control. It comprises of the proposed new drains along with improvement of existing drainage structures, embankment and sidewall. Outfall locations of each existing and proposed drain were designated after assessing the flow direction of existing canal network and land slope.

14.3.1.2 Proposal for improvement of the existing drain networks

In order to drain out the anticipated future peak runoff to be generated from rainfall due to increase in impervious land cover as well as built-up areas and to mitigate the vulnerability of rainfall induced flooding and water logging, some existing secondary drains have been identified for improvement. The details of improvement of identified existing drains are shown in Table 14.6.

Table 29.6: **List of drains for proposed improvement**

Sl. No.	Drain ID	Existing Type	Ward No.	Proposed Type	Existing Width (m)	Proposed Width (m)
01	3	Pucca	1	Primary Drain	1	1.524
02	1	Pucca	8	Primary Drain	.5	1.524
03	4	Pucca	2	Secondary Drain	.5	0.762
04	11	Pucca	2	Secondary Drain	.5	0.762
05	27	Pucca	1	Primary Drain	.5	1.524
06	4	Pucca	1, 2	Tertiary Drain	.3	0.457
07	21	Pucca	2	Tertiary Drain	.3	0.457

14.3.1.3 List of proposed new drains

For effective functioning of existing drainage network, some new drains have been proposed in the project area which is listed in **Table-14.7**. The list has been prepared based of analysis of topographic map, existing drainage network, field visits and consultation with the Paurashava officials and local people. The proposed drains along with existing drains and other drainage infrastructures are shown in **Map-14.2**.

Table 29.7: **List of proposed new drains**

Type	ID	Pro_Width	Ward No.	Outfall	Direction	Length Km
Primary Drain	PD-01	1.524	Ward 1, 2	Betraboti River	W-E	0.74
	PD-02	1.524	Ward 1, 2	Betraboti River	W-E	0.72
	PD-03	1.524	Ward 1, 2, 3	Betraboti River	W-E	1.22
	PD-04	1.524	Ward 3, 5	Betraboti River	W-E	0.57
	PD-05	1.524	Ward 4, 5	Betraboti River	W-E	1.00
	PD-06	1.524	Ward 6	Betraboti River	N-S	0.95
	PD-07	1.524	Ward 7	Betraboti Road	E-W	0.95
	PD-08	1.524	Ward 8	Betraboti River	E-W	0.92
	PD-09	1.524	Ward 8, 9	Betraboti River	E-W	0.74
Sub Total						**7.83**
Secondary Drain	SD-01	0.762	Ward 1, 2	Betraboti River	W-E	0.96
	SD-02	0.762	Ward 2	Khal	N-S	0.39
	SD-03	0.762	Ward 3	PD-03	W-E	0.52
	SD-04	0.762	Ward 2, 3	PD-03	W-E	0.51
	SD-05	0.762	Ward 4	PD-05	W-E	0.89
	SD-06	0.762	Ward 5, 6	Betraboti River	S-N	0.70
	SD-07	0.762	Ward 5	SD-06	W-E	0.44
	SD-08	0.762	Ward 6	Betraboti River	W-E	0.29
	SD-09	0.762	Ward 6	Betraboti River	W-E	0.22
	SD-10	0.762	Ward 7	Betraboti River	E-W	0.41
	SD-11	0.762	Ward 7	Betraboti River	E-W	0.84
	SD-12	0.762	Ward 8	Khal	E-W	0.44
	SD-13	0.762	Ward 8	Betraboti River	E-W	0.28
	SD-14	0.762	Ward 8	Betraboti River	E-W	0.43
	SD-15	0.762	Ward 9	Betraboti River	E-W	0.39
	SD-16	0.762	Ward 9	Betraboti River	SE-NW	0.57
	SD-17	0.762	Ward 9	Betraboti River	S-N	0.38
Sub Total						**8.66**
Tertiary Drain	TD-01	0.457	Ward 1	PD-02	E-W	0.60
	TD-02	0.457	Ward 1	PD-02	S-N	0.23
	TD-04	0.457	Ward 2	SD-02	W-E	0.41
	TD-05	0.457	Ward 2	PD-01	N-S	0.29
	TD-08	0.457	Ward 2	Betraboti River	W-E	0.29
	TD-06	0.457	Ward 2	Betraboti River	W-E	0.18
	TD-03	0.457	Ward 1	PD-03	N-S	0.14
	TD-15	0.457	Ward 3	SD-03	N-S	0.15
	TD-09	0.457	Ward 3	SD-03	S-N	0.39
	TD-10	0.457	Ward 3	SD-04	N-S	0.16
	TD-16	0.457	Ward 3	SD-04	N-S	0.16
	TD-11	0.457	Ward 3	PD-04	N-S	0.34
	TD-07	0.457	Ward 2	Betraboti River	W-E	0.14
	TD-12	0.457	Ward 3	PD-04	N-S	0.19

Type	ID	Pro_Width	Ward No.	Outfall	Direction	Length Km
	TD-13	0.457	Ward 3	PD-04	S-N	0.11
	TD-14	0.457	Ward 3	PD-04	S-N	0.14
	TD-17	0.457	Ward 4	PD-05	W-E	0.37
	TD-18	0.457	Ward 4	PD-05	N-S	0.14
	TD-21	0.457	Ward 5	SD-06	W-E	0.48
	TD-19	0.457	Ward 5	PD-05	S-N	0.20
	TD-20	0.457	Ward 5	PD-05	S-N	0.18
	TD-22	0.457	Ward 5	SD-07	N-S	0.19
	TD-23	0.457	Ward 5, 6	Betraboti River	S-N	0.24
	TD-24	0.457	Ward 6	Betraboti River	W-E	0.39
	TD-25	0.457	Ward 6	Betraboti River	W-E	0.37
	TD-26	0.457	Ward 6	PD-06	S-N	0.40
	TD-27	0.457	Ward 6	SD-08	N-S	0.28
	TD-29	0.457	Ward 6	Betraboti River	W-E	0.21
	TD-28	0.457	Ward 6	SD-09	N-S	0.25
	TD-30	0.457	Ward 6	Betraboti River	W-E	0.29
	TD-31	0.457	Ward 7	Betraboti River	E-W	0.23
	TD-32	0.457	Ward 7	Betraboti River	E-W	0.38
	TD-33	0.457	Ward 7	Betraboti River	E-W	0.26
	TD-34	0.457	Ward 7	Betraboti River	E-W	0.41
	TD-35	0.457	Ward 7	PD-07	E-W	0.46
	TD-36	0.457	Ward 8	PD-08	S-N	0.25
	TD-37	0.457	Ward 8	PD-08	N-S	0.37
	TD-39	0.457	Ward 8	SD-13	SE-NW	0.26
	TD-38	0.457	Ward 8	Betraboti River	E-W	0.25
	TD-40	0.457	Ward 8	Betraboti River	E-W	0.28
	TD-41	0.457	Ward 9	PD-09	E-W	0.31
	TD-42	0.457	Ward 8	Betraboti River	E-W	0.19
	TD-43	0.457	Ward 9	SD-15	N-S	0.19
	TD-44	0.457	Ward 9	Betraboti River	E-W	0.42
Sub Total						**12.16**
Grand Total						**28.64**

14.3.1.4 List of Infrastructure measures for Drainage and Flood Control Network

Box Culverts and cross drains along with proposed drains and roads should be established in the appropriate location for smoth flow of rain water.

Map 29.3: Drainage Network Proposal Plan of Kalaroa Paurashava

14.4 Plan Implementation Strategies

14.4.1 Regulations to implement the Drainage and Flood Plan

A common scenario in an uncontrolled urbanization is that flood plain occupation by the population takes place, in a sequence of years with small flood levels. When higher flood levels return, damage increases and the public administrations have to invest in population relief. Structural solutions have higher costs and it is feasible only when damages costs are greater than their development or due to intangible social aspects and redevelopment.

The Ministry of Water Resources, through its implementing arm-the Bangladesh Water Development Board (BWDB), implements the flood control and drainage (FCD), flood control, drainage and irrigation (FCDI) and other development projects. It prepares and implements development projects relating to FCD/FCDI projects; riverbank erosion control; delta development and land reclamation; etc. and provides irrigation, drainage, flood protection, bank erosion protection, land reclamation facilities by constructing barrages, regulators, sluices, canals, cross-dams, embankments and sea-dykes along the banks of the rivers and the coast, etc.

Regulations prescribed in the National Water Policy, 1999 is proposed as the legal basis for implementing the Drainage and Flood Plan. The National water policy, promulgated in 1999 provides policy direction for water sector. Under the NWPo, WARPO has been made secretariat to the National Water Resources Council (NWRC) and is responsible for preparing the NWMP and subsequent updates, and monitoring implementation. Agencies are responsible for preparing their own sub-regional plans within the framework established by NWMP.

Flood Action Plan was finalized in November 1989 comprising 26 components as an initial stage (1990-95) in the development of a long term comprehensive system of flood control and drainage works in Bangladesh. The Action Plan included project-oriented studies in all of the country's main regions along with supporting activities to promote better project design and execution. Thus, Flood Action Plan can be exercised as a legal framework for implementing the Drainage and Flood Plan.

The principal national institution concerned with flood management is the BWDB. The Joint River Commission (JRC) and BWDB carry out international and regional data and information exchange. BWDB disseminates all kinds of flood information to all related Government Departments and Organizations.

Flood management relating to water management at national level is co-coordinated by the National Water Council and the Ministry of Water Resources. Flood management relating to disaster management is co-coordinated by the National Disaster Management Council, particularly by the Ministry of Disaster Management and Relief. Over-all coordination during the flood event is the responsibility of the latter Ministry and the Inter-Ministerial Disaster Management Committee.

14.4.2 Implementation, monitoring, Evaluation and Coordination of the Plan

The implementation, monitoring and evaluation strategies of Structure Plan have been illustrated in Chapter-9 of Part-A. The Drainage Plan should also be implemented,

monitored and evaluated under the same strategy by strengthening capacity of the Paurashava and forming a Monitoring and Evaluation Committee (MEC).

As The Drainage Plan is a mid-term plan with a period of 10 years (2011-2021), it will be implemented on phase wise according to priority. The proposals have been prioritized based on the priority needs, since Bangladesh is a least developed country and it has a very limited budget for infrastructure development. Besides, the Paurashava Authority itself is not capable of financing this huge cost.

The Drainage Plan will be implemented gradually following prioritized Drainage proposals including improvement of existing drain, proposed new drain, bridges/culvert, cross drain etc. Phasing of proposals was done based on the priority. The Phase-I of the proposals, to be also incorporated in the Ward Action Plan, will be implemented within first 5 year (2011-2016) of the plan period. The consultants have proposed Phase-II of the proposals to be implemented within next 5 years succeeding the recent past Ward Action Plan. The details of phasing are shown in **Table 14.8**. After each 5 years the Plan will be evaluated, updated and new Ward Action Plan will be formulated under the changing circumstances.

Table 29.8: Phasing of Proposed Drains

Phase-I (2011-2021)					Phase-II (2021-2031)				
Type	**ID**	**Ward No.**	**Width (m)**	**Length (m)**	**Type**	**ID**	**Ward No.**	**Width (m)**	**Length (m)**
Primary Drain	PD-01	Ward 1, 2	1.524	741.09	**Secondary Drain**	SD-03	Ward 3	0.762	523.64
	PD-02	Ward 1, 2	1.524	724.53		SD-04	Ward 2, 3	0.762	506.46
	PD-03	Ward 1, 2, 3	1.524	1223.30		SD-05	Ward 4	0.762	887.93
	PD-04	Ward 3, 5	1.524	567.44		SD-07	Ward 5	0.762	436.77
	PD-05	Ward 4, 5	1.524	1003.36	**Tertiary Drain**	TD-01	Ward 1	0.457	603.44
	PD-06	Ward 6	1.524	949.62		TD-02	Ward 1	0.457	233.67
	PD-07	Ward 7	1.524	952.50		TD-03	Ward 1	0.457	140.72
	PD-08	Ward 8	1.524	923.48		TD-04	Ward 2	0.457	413.86
	PD-09	Ward 8, 9	1.524	744.66		TD-05	Ward 2	0.457	293.49
Secondary Drain	SD-01	Ward 1, 2	0.762	957.58		TD-09	Ward 3	0.457	151.35
	SD-02	Ward 2	0.762	386.13		TD-10	Ward 3	0.457	394.51
	SD-06	Ward 5, 6	0.762	700.77		TD-11	Ward 3	0.457	158.29
	SD-08	Ward 6	0.762	294.03		TD-12	Ward 3	0.457	156.56
	SD-09	Ward 6	0.762	218.60		TD-13	Ward 3	0.457	335.45
	SD-10	Ward 7	0.762	411.30		TD-14	Ward 3	0.457	186.92
	SD-11	Ward 7	0.762	837.52		TD-15	Ward 3	0.457	109.95
	SD-12	Ward 8	0.762	435.38		TD-16	Ward 3	0.457	139.46
	SD-13	Ward 8	0.762	283.65		TD-17	Ward 4	0.457	365.40
	SD-14	Ward 8	0.762	434.13		TD-18	Ward 4	0.457	141.86
	SD-15	Ward 9	0.762	390.19		TD-19	Ward 5	0.457	484.49
	SD-16	Ward 9	0.762	571.83		TD-20	Ward 5	0.457	201.66
	SD-17	Ward 9	0.762	381.95		TD-21	Ward 5	0.457	183.82
Tertiary Drain	TD-06	Ward 2	0.457	291.53		TD-22	Ward 5	0.457	187.36
	TD-07	Ward 2	0.457	176.07		TD-26	Ward 6	0.457	395.25
	TD-08	Ward 2	0.457	136.70		TD-27	Ward 6	0.457	284.92
	TD-23	Ward 5, 6	0.457	239.68		TD-29	Ward 6	0.457	246.35
	TD-24	Ward 6	0.457	388.25		TD-35	Ward 7	0.457	455.82
	TD-25	Ward 6	0.457	368.54		TD-36	Ward 8	0.457	253.65
	TD-28	Ward 6	0.457	213.40		TD-37	Ward 8	0.457	365.86
	TD-30	Ward 6	0.457	287.73		TD-38	Ward 8	0.457	262.43
	TD-31	Ward 7	0.457	225.35		TD-42	Ward 9	0.457	314.39
	TD-32	Ward 7	0.457	384.78		TD-43	Ward 9	0.457	186.18

Phase-I (2011-2021)						Phase-II (2021-2031)	
	TD-33	Ward 7	0.457	263.63			
	TD-34	Ward 7	0.457	407.09			
	TD-34	Ward 9	0.457	416.03			
	TD-39	Ward 8	0.457	249.24			
	TD-40	Ward 8	0.457	275.19			
	TD-41	Ward 8	0.457	190.18			

With regards to plan implementation strategy monitoring and evaluation is a very important part of plan implementation. Monitoring helps check if the plan is being implemented properly. It also measures the level of implementation of the plan. If the plan implementation is not on track, corrective measures can be taken to put execution on the track. After expiry of any plan evaluation is made about the errors and omissions. Such evaluation helps take corrective measures in the next plan. Such monitoring and evaluation must be carried out from within the Paurashava. But Kalaroa Paurashava is not equipped with qualified manpower to make such evaluation. Monitoring and evaluation of a plan is essentially, the responsibility of qualified and experienced planners. As there is no planner in the Paurashava, its monitoring of plan implementation will be seriously affected. However, plan evaluation can be accomplished by means of out-sourcing.

Part- II: Environmental Management Plan

14.5 Introduction

14.5.1 Goals and Objectives

Following are the overall objectives of environmental management plan:

a. To create a sustainable living environment.

b. To create awareness among citizens about livable environment.

14.5.2 Methodology and Approach to Planning

The environmental management plan consists of the Supplementary Living Environment Survey, the Comprehensive Ecological Survey and the Water Quality Survey. The Supplementary Living Environment includes water supply, land pollution, sewerage and sanitation, solid waste management, and resettlement of population due to construction of canals and primary drains. The Comprehensive Ecological Survey aims at facilitating comprehensive environmental assessment by subsequent urbanization and implementation of the drainage on the ecological elements of fauna and flora, agricultural and aqua cultural resources etc. The Water Quality Survey is the sampling and analysis of surface water from rivers, natural canals, ponds etc., and from ground water. These are required to be done to ensure necessary urban environment enhancement measures. Moreover, an overall evaluation of environmental condition due to urbanization with flood management and drainage is required in order to justify the necessity of the Drainage Plan. In planning process special attention required to reduce the insect breeding areas, and preserve and management of natural drainage area.

14.6 Existing Environmental Condition

14.6.1 Introduction

The urban environment of the Kalaroa Paurashava includes both build and natural environment. Build environment includes waste management, water, air quality, energy usage, transport network, slum improvement, and disaster mitigation. The urbanization where the build environment overburdens the natural environment cannot be sustainable. But urbanization is vital for countries economic growth. Urban centers concentrate services, infrastructure, labor, knowledge, entrepreneurship and markets.

So in every phase of planning processes all these environmental issues will be evaluated and proper measure will be taken to minimize the adverse environmental impacts on land pollution, water and air quality, biodiversity resources and marine resources by energy usage, transport network, waste management, slum improvement, disaster mitigation etc.

14.6.2 Geo-morphology

Topographically, Kalaroa Paurashava is a plain land. The plain land mainly consists of fluvio-deltaic sediments deposited by the Ganges river systems. Geomorphologically, Kalaroa Paurashava falls under the Floodplains of the Ganges river having distinguishing character.

14.6.3 Solid Waste and Garbage disposal

The solid waste and Garbage disposal of Kalaroa Paurashava includes household waste, industrial waste, kitchen market waste, clinic/hospital waste, latrine waste, brickfield waste and fertilizer/chemical related waste. The production of solid waste in Kalaroa per person per day is around 260gm and the total Paurashava production is 7.09 ton/day. The household waste is thrown to roadside drains or open spaces adjacent to the houses. The Garbage from kitchen market and untreated hospital waste from UHC disposed to open space by the side of the road, drain or ditch and polluting living environment which is a great threat to human health.

14.6.4 Waste Management System

Though the Paurashava has recently launched the provision of solid waste management, the facility is yet scanty to accommodate the prevailing needs. The solid waste management system of Kalaroa Paurashava comprises 8 dustbins, 1 Garbage truck, no push cart/ rickshaw van and no waste disposal site of its own. And, the whole system is assisted by few workers those are temporarily appointed by The Paurashava authority.

14.6.5 Pollutions

14.6.5.1 Water

In nature water is available both from the surface and underground. The sources of surface water of Kalaroa Paurashava like ponds, ditches and khals are being contaminated from improper sanitation, solid waste disposal, improper treatment and disposal of hospital waste, use of chemical fertilizers, poisonous insecticides, etc. The sanitation coverage is claimed 100% by the Paurashava authority. The rest inhabitants of the Paurashava, uses katcha latrines, open latrines and hanging latrines. The human excreta from improper sanitation come in contact with sources of water and water bodies especially during rainy season. Hospital waste is another source of water contamination. In the Paurashava there is an Upazila Health Complex (UHC), and some private pathological laboratories. They are producing contaminated hospital wastes. The UHC and others have neither specific land to bury their wastes nor any incinerator to burn them. The hospital wastes are thrown to nearby open spaces, ditches and roadside drains with other wastes. The Paurashava has poor solid waste collection system and covers the insignificant portion of the total area. In most cases the solid wastes are dumped in open spaces, road side drains, ditches, near bridges and culverts etc. The decomposed market and kitchen waste produce highly polluted leached where they are dumped and flows to adjacent land. During rainy season it comes in contact with rain water, some percolate into the ground and the rest flows to water bodies and thus contaminates the nature's water system. Another source of water pollution is use of chemical fertilizer in agricultural land. The pollution from agrochemicals in water bodies and river has reached at alarming levels. The long-term effects of this water contamination by inorganic substances, many of them toxic, are incalculable. It is affecting the marine and aquatic ecosystems and the chemicals are entering into the food chains, which have public health implications.

Ground water is the only source for the supply of safe drinking water to the inhabitants of the Paurashava. The Paurashava has no water supply network. Neither the Paurashava nor DPHE has any record nor census of hand tube wells within the Paurashava. The

ground water table of the Paurashava varies from minimum 6ft during rainy season to maximum 22ft during winter. The ground water of Kalaroa Paurashava is heavily loaded with iron. Hand tube wells contain iron and other harmful minerals and are main cause for most of the chronic intestinal diseases. Moreover, during winter the level of ground water table goes down and concentration of iron in ground water increases. Another probable source of ground water pollution may be the arsenic contamination. Arsenic is mostly found in water harvested from the upper and mid aquifers. Arsenic was first detected in groundwater in Bangladesh in 1993. For identifying whether the extracted ground water is arsenic contaminated or not the DPHE is working for. The DPHE identified few tube wells contaminated by arsenic in Kalaroa Paurashava. The contaminated hand tube wells were abandoned and new wells were constructed in those places.

14.6.5.2 Air

The main sources of air pollution of the Paurashava are emission of harmful gaseous matters from vehicles, lack of proper solid waste management system, industrial sector, construction, and wood and biomass consumption etc. Due to rapid urbanization of the Paurashava the total number of motorized vehicles including bus, truck, tempo, three wheeler, etc., has been increased. These automobiles on the road are very old, overloaded and poorly maintained and emit smoke far exceeding the prescribed limit. Dumping of Garbage to open land and ditches allows the objectionable odor of Garbage to spread in air. Industrial development within the Paurashava is another major source of air pollution. The Saw Mills are spreading dust in air. The smoke from the chimneys of rice mills and bakery are increasing carbon dioxide content and polluting the air. Polluted air is harmful for human health depending on the nature of the pollutant, concentration, duration of exposure and the state of health and age group of the recipient. Apart from impact on human health, air pollution has detrimental impact on the ecosystem, vegetation and livestock. A continuous monitoring is necessary to evaluate air quality for the development plan to mitigate the health risk from air pollution. The type of industries and their number within the Paurashava is listed in **Table 14.9** below:

Table 29.9: **No of Industries in Kalaroa Paurashava**

Sl. No.	Type of Industry	Number	Pollutant	Effluent treatment plant
01	Rice Mill	4	Harmful gases	Not require
02	Brick Field	2	Harmful gases	Required
03	Saw Mill	6	dust	Not require
04	Bakery & Flour Mill	1	Harmful gases	Not require
Total		**13**		

Source: Field Survey, 2008-2009 by DDC

14.6.5.3 Sound

Sound pollution is quite significant in Kalaroa Paurashava. There are altogether 12 number light and cottage industries which include oil mills, saw mills, husking mills, bakeries, ice factories and light engineering workshops. Out of them saw mills and engineering workshops produces low noises. The moving vehicles also produce noise. In market days traffic load increases near rice mills and bazar areas. The population of public carrier is relatively high during bazaar days in Kalaroa and they produce moderate level of noise. Also there are carpentry shops, tailoring shops and blacksmith shops in residential areas those are producing noise.

14.6.5.4 Arsenic

The ground water of Kalaroa Paurashava is heavily loaded with iron. Hand tube wells contain iron and other harmful minerals and are main cause for most of the chronic intestinal diseases. Moreover, during winter the level of ground water table goes down and concentration of iron in ground water increases. Another probable source of ground water pollution may be the arsenic contamination. Arsenic is mostly found in water harvested from the upper and mid aquifers. It is of natural origin coming from sedimentary materials containing the arsenic in potentially soluble forms. It is believed to be released to groundwater under reducing conditions. Arsenic was first detected in groundwater in Bangladesh in 1993. The DPHE identified few tube wells contaminated by arsenic in Kalaroa Paurashava. The contaminated hand tube wells were abandoned and new wells were constructed in those places.

14.6.6 Natural Calamities and Localized Hazards

14.6.6.1 Cyclone

Although Bangladesh is cyclone prone area, yet Kalaroa Paurashava is out of range of tropical cyclone which occur mainly the coastal areas of Bangladesh. And Kalaroa Paurashava is also free from Nor'werters and Tornadoes. The Nor'werters, severe seasonal storm locally known as Kalbaishakhi occurs during pre-monsoon season. Severe Nor'westers is generally associated with tornadoes. Tornadoes are suddenly formed and are extremely localized in nature and of brief duration.

14.6.6.2 River Erosion

River Erosion is not a major problem for Kalaroa as there is Betraboti River is not erosion prone. The increase in rainfall in summer is apprehended due to climatic change and the current deforestation in tern increase the surface erosion of land.

14.6.6.3 Flood

The Betraboti River flows from the Middle of Kalaroa Upazila. But, Kalaroa Paurashava is not affected by any kinds of flood.

However, during rainy season few places of the Paurashava become water logged.

14.6.6.4 Earthquake

An earthquake is the result of a sudden release of energy in the Earth's crust that creates seismic waves. The seismicity or seismic activity of an area refers to the frequency, type and size of earthquakes experienced over a period of time. The north and north easterly part of Bangladesh is the most active seismic zone and had experienced earthquakes of moderate to high intensity in the past.

Bangladesh has been divided into three generalized seismic zones: zone-I, zone-II and zone-III. Zone-III comprising the Southern regions of Bangladesh, is a zone of low seismic risk with a basic seismic co-efficient of 0.03. Kalaroa Paurashava falls under this zone which is considered as the less vulnerable seismic zone of Bangladesh.

14.6.6.5 Water Logging

The water logging created also in some build up areas. In most cases, where water logging occurs the housing are at lower elevation than the road level. During monsoon when the rainfall intensity is very high, the remaining water after infiltration and evaporation retains on the ground where water logging occurs. Due to lack of drainage facility water retains there until it dries up. In some areas water logging condition prevails for weeks together. Water logging problem starts in June and continues until end of October.

14.6.6.6 Fire Hazard

Fire hazard is any situation in which there is a greater than normal risk of harm to people or property due to fire. Kalaroa often faces a range of disaster events including flood, drought, fires and other man-made hazards. Fire inevitably causes upheavals not only in the physical but also in the social and economic context where they occur. Although a fire disaster need not necessarily reach catastrophic proportions, it will present some of the characteristic aspects of a disaster because of the highly destructive action of fire and of the considerable number of victims.

Generally fire causes the great loss of life and property in any urban areas. Dense building concentration, narrow roads, flammable building materials, aging water supply and electrical system, as well as the lack of resources to upgrade preparedness and response skills have resulted in the growing risk of large scale, multiple structure fires.

Fire incidents in shops, industrial and commercial buildings cause heavy toll of life and property. The fire incidents are on an increase due to lack of awareness, almost no feeling for following safety measures and practicing fire fighting drills, violation of building codes and non-compliance with the fire checking and extinguishing law.

As per the record of Paurashava office of Kalaroa up till now fortunately the rate of fire hazard is very negligible in Kalaroa Paurashava. Presence of flammable building material and use of fire wood and kerosene for cooking purposes often causes danger.

14.6.6.7 Other Hazards

Cyclone, River erosion, Earthquake, Water logging, Fire etc. are the type of hazards, which occasionally affect the land of Kalaroa Paurashava with minimum scale. Any hazard other than mentioned above is not yet identified at Kalaroa Paurashava Town area.

14.7 Plan for Environmental Management and Pollution Control

14.7.1 Proposals for Environmental Issues

14.7.1.1 Solid waste management Plan

Solid waste management is not yet an environmental problem in the town because of low density of population and low consumption rate. But in future population will rise and density will increase. So solid waste will pose a major environmental problem in future. It is better to take precautionary measures now to avoid any future hazard.

A waste disposal ground is proposed at the extreme Middle-East side of the Paurashava for final dumping of solid waste in order to ensure a habitable environment and to keep the urban environment free from pollution. To solve the solid waste management problem door to door collection program should be introduced. The Paurashava authority along with NGO's and CBO's will collect wastes from the households and storage points daily. The van will move into the wards and whistle to announce its arrival. The same vehicle will cover other institutions, societies, complexes. Thus the system will cover the whole town and will transfer the waste to the proposed waste transfer stations. After that, the Truck/Van of the Paurashava will dump the wastes to the proposed waste disposal ground. A minimum charge will be fixed by the Paurashava authority for waste collection to the inhabitants. The total process is exposed under Figure 14.1. The list of Waste Transfer Stations and Waste Disposal Ground is listed in Table-14.10.

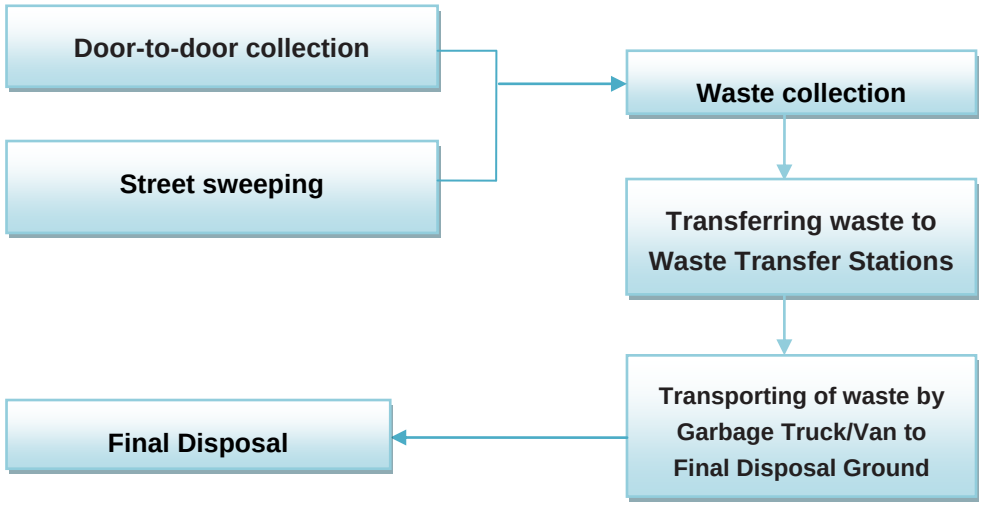

Figure 29.1: **Overview of the Solid Waste Management Plan**

Table 29.10: **List of Proposed Waste Disposal Facilities**

ID	Type of Facilities	Location	Ward No.	Area (Acre)	Mouza Schedule	
					Mouza	Plot No.
WDG	Waste Disposal Ground	North corner of the Paurashava	Ward 2	5.679	Tulshidanga_59_02	1029-1036, 1038-1041
WTS-1	Waste Transfer Station	In Jhikra, near the core area	Ward 3	0.131	Jhikra_60_01	456, 458, 459, 461
WTS-2	Waste Transfer Station	In Murarikathi	Ward 7	0.263	Murarikathi_62_02	2213-2215
WTS-2	Waste Transfer Station	In Mirzapur	Ward 9	0.221	Mirzapur_69_00	263-266

Mitigation Measures

1. Introduction home collection system.
2. Creation of solid waste transfer stations at important locations.
3. Creation of a dumping site for disposal of solid waste.
4. Uses of sanitary land fill method for treatment of waste at the dumping site.

14.7.1.2 Plan for protecting open space, wet-land and relevant features

Open Space Promotion

Currently there are only few open spaces in Kalaroa Paurashava. If the plan is implemented by the year 2031, the ratio will be 1.27 acres per thousand populations. But there will be hardly any scope to provide further open space. So, the provision of open space must be implemented in the study area for the greater interest of the future urban dwellers.

Mitigation Measures

1. The open space provisions have to be implemented to save future town environment.
2. Adequate fund is needed to be allotted to execute open space development.
3. No plan should be allowed in locations of open space as per plan.
4. Landowners may be motivated to donate land for open space development.

Wetland Protection

Most of the natural khals flowing through the town have been encroached by land hungry people. At many places the khals have been filled up. All these activities are causing khals to get squeezed lowering their capacity to drain enough water during monsoon. If this trend continues, it will increase flood risk and water logging in the low-lying town.

Mitigation Measures

1. Strict measures should be taken to recover state property from encroachers.
2. Wherever land fill has been done, re-excavation has to be done to recover khals.
3. Marking pillars should be set up to mark Khas lands of the khal area.
4. Vegetation may be created along the Khal creating buffer zone between khal and the private property.

14.7.2 Proposals for Pollution Control

14.7.2.1 Industrial

Industrial pollution is an important issue of the day and it is getting more and more monstrous. There is also a need to raise general awareness among common people. It is one of the aims of planning to create a physical environment that will be congenial to the individual family and community and to establish a physical environment that will effectively promote economic development. This face to the measures to tackle the pollution issue within a community is one of the targets of planning. As this leads to the safer and healthier environment.

In order to keep the residential and commercial area free from industrial pollution, an industrial zone comprising of general and heavy industry is proposed at the Middle side (Beside Jessore-Satkhira Road in Jhikra) of the Paurashava. This zone will occupy an area of 52.236 acres and all the existing industries, incompatible with the living environment, are proposed to be rehabilitated into this zone. There will be distinct area for general industry (Green and Orange A Category) and heavy industry (Orange B and Red Category) with proper treatment plant.

The possible means that can be adopted to minimize the pollution may include:

- Proper zoning.
- Improvement of living conditions location of industrial units on proper sites.
- Protection of residents from industrial pollution by means of buffer zoning.
- Raising awareness among people.
- Arranging community programs to take pollution issue.

For the purpose of controlling industrial pollution local level steps can be very much effective. The best way to tackle urban problems is through integrated action. The following steps can be taken:

- Encourage industrial settlements within the municipality
- Shift all industrial units outside the residential area.
- Before establishing new industrial units they should be bounded to assume that they will try to minimize the factors affecting environment.
- Pollution causing industries should be penalized.
- Repeated checking of industrial units should be made to ensure that effluents of industries are within acceptable limits.

Following are the three important ways which are adopted for controlling the location of industries:

- By developing industrial zones
- By granting concessions; and
- By imposing restrictions.

Treatment methods for industrial wastes will depend upon their characteristics and various other factors. In general, treatment recommended should be such that it recovers some useful substances from the industrial wastes. This will encourages the industry owner for

the suitable treatment to the industrial wastes and it will also reduce the cost of such treatment.

14.7.2.2 Air/Water/Land/Sound

Air

Every day, the average person inhales about 20,000 liters of air. Every time we breathe, we risk inhaling dangerous chemicals that have found their way into the air.

Air pollution includes all contaminants found in the atmosphere. These dangerous substances can be either in the form of gases or particles.

Air pollution can be found both outdoors and indoors. Pollutants can be trapped inside buildings, causing indoor pollution that lasts for a long time.

The sources of air pollution are both natural and human-based. As one might expect, humans have been producing increasing amounts of pollution as time has progressed, and they now account for the majority of pollutants released into the air.

As there is no heavy industries releasing toxic air pollutants such as CFC, heavy metals, SPM etc. and the number of automobiles plying over the town is at a minimized level, no pollution control or regulatory measures for Kalaroa Paurashava is proposed in the plan.

Water

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans and groundwater). Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds.

Water pollution affects, plants, and organisms living in these bodies of water; and, in almost all cases the effect is damaging not only to individual species and populations, but also to the natural biological communities.

Water pollution can be controlled in the multiple ways. It is best controlled by the dilution of water. The pollutants must be treated chemically and must be converted into the non toxic substances. The low level of radioactive wastes in the water is removed by the oxidation of ponds. There are certain chemicals which act on the organic insecticide and are used in the pesticide. There are different techniques which are very helpful in the process of thermal pollution and involve the cooling, evaporation, water cooling; cooling can be wet or dry. Their main aim is to keep the water cool in rivers and streams. The shallow ponds must be used to store the domestic and industrial wastes. One must avoid the large ponds. The waste has a presence of sunlight and organic nutrients which may lead to the larger growth of bacteria which act on the waste matter. The reclaimed polluted water can be used in making fertilizers as it is rich in phosphorous, potassium and nitrogen. It can also be used for the irrigation and factories purposes. The proper sewage treatment plans play a crucial role in the reclaimed polluted water. There must be a law which ensures that the industries must treat the waste before the water is discharged into the rivers and seas. The polluted water can be treated by the use of a plant known as water hyacinth which is also referred as kaloli. It deals with the biological and chemical waste. The heavy metals are also removed by it.

Land

Land pollution is the degradation of Earth's land surfaces often caused by human activities and their misuse of land resources. It occurs when waste is not disposed properly. Urbanization and industrialization are major causes of land pollution.

Land pollution is the deposition of solid or liquid waste materials on land or underground in a manner that can contaminate the soil and groundwater, threaten public health, and cause unsightly conditions and nuisances.

The waste materials that cause land pollution are broadly classified as municipal solid waste, construction and demolition waste or debris, and hazardous waste. MSW includes nonhazardous Garbage, rubbish, and trash from homes, institutions (e.g., schools), commercial establishments, and industrial facilities. Garbage contains moist and decomposable (biodegradable) food wastes (e.g., meat and vegetable scraps); rubbish comprises mostly dry materials such as paper, glass, textiles, and plastic objects; and trash includes bulky waste materials and objects that are not collected routinely for disposal (e.g., discarded mattresses, appliances, pieces of furniture). C&D waste (or debris) includes wood and metal objects, wallboard, concrete rubble, asphalt, and other inert materials produced when structures are built, renovated, or demolished. Hazardous wastes include harmful and dangerous substances generated primarily as liquids but also as solids, sludge, or gases by various chemical manufacturing companies, petroleum refineries, paper mills, smelters, machine shops, dry cleaners, automobile repair shops, and many other industries or commercial facilities.

Sound

Sound pollution is a serious issue for many companies. Although the long-term effects of sound pollution have not yet been determined as of the time of publication, the Environmental Protection Agency states that sound pollution has been linked to high blood pressure, sleep disruption and hearing loss. While some industries are noisier than others, it is generally necessary to institute at least some sound pollution controls in any workplace, particularly if the noise limits exceed the accepted decibel level.

Sound pollution reduction/controlling measures:

- Construction of sound proof rooms for noisy machines in industries.
- Use of horns with jarring sounds to be banned.
- Sound producing industries to be shifted away from the inhabited areas.
- Proper law should be enforced to check the misuse of loudspeakers and public announcements systems.
- To enforce silence zones near schools/ colleges, hospitals etc.
- Growing green plants/trees along roadside to reduce sound pollution as they absorb sound.
- Loud speakers are banned for certain time limit.

14.7.2.3 Other Pollution

Any pollution other than mentioned above is not yet identified at Kalaroa Paurashava Town level.

14.7.3 Natural calamities and hazard mitigation proposals

Flood, Tornado and Earthquake are the usual hazards applicable for Kalaroa Paurashava. In order to address the flood hazard the following points are to be considered carefully and protection plans are to be prepared:

- Rainfall Intensity

- Storage Coefficient

- Runoff Coefficient and

- Catchment Area

Since there is susceptibility to water logging, drainage structures e.g. drains, excavation of canals, culverts etc. are required for this Paurashava. Moreover, houses should be constructed so that the plinth level is elevated enough above a certain level for a return period of at least 10 years to safeguard water logging.

Regarding Tornado and Earthquake prior information to the people by means of weather forecasting and seismological information will be of helpful.

14.7.3.1 Plan for addressing Natural Calamities (Structural and non structural measures)

Natural Calamities e.g. tornado, or earthquake etc. that affects the environment, and leads to financial, environmental and/or human losses. The resulting loss depends on the capacity of the population to support or resist the disaster, and their resilience. This understanding is concentrated in the formulation: "disasters occur when hazards meet vulnerability." A natural hazard will hence never result in a natural disaster in areas without vulnerability, e.g. strong earthquakes in uninhabited areas. The term natural has consequently been disputed because the events simply are not hazards or disasters without human involvement.

14.7.3.2 Plan for addressing hazards (Structural and non structural measures)

National Plan for Disaster Management 2010-2015 has been prepared in April, 2010 aiming at reducing vulnerability of the poor to natural, environmental and human-induced disaster to a manageable and acceptable level. There will be a plan for Paurashava titled “Paurashava Disaster Management Plan” to be prepared by the “Paurashava Disaster Management Committee” having linkages with the National Plan for Disaster Management.

14.7.3.3 Plan for addressing encroachment leading to hazards

The term encroachment is only applicable for flood hazard. It has been observed that few people construct their houses, go-downs, stores, business premises farms or industries in an un-authorized manner by encroaching the drains, khals and river area, which make hindrance the natural flow of water. During the excessive rain the surface water become obstructed by those un-authorized encroachment and create water logging and flood. Thus, all type of un-authorized encroachment should be removed.

14.8 Plan Implementation Strategies

14.8.1 Regulations to implement the Environmental Management Plan

The first major law that has been promulgated for the specific purpose of protection of environment and conservation of nature is the Environmental Conservation Act (ECA) of 1995, which was followed by the Environmental Conservation Rules (ECR) of 1997.The Environmental Conservation Act of 1995 empowered the MOEF to formulate rules and guidelines for the management. It also designates DOE responsible for enforcing the 1997 EIA procedures air pollution, water pollution, noise. Environmental Conservation Rules of 1995 was also formulated to control air pollution, water pollution and noise. These Acts and Rules are effective instrument for combating air pollution, water pollution and noise.

Under the Environment Conservation Rules, 1997 the industrial units and projects are, in consideration of their site and impact on the environment, classified into the four categories, e.g. Green, Orange-A, Orange-B and Red for the purpose of issuance of Environmental Clearance Certificate. So the Paurashava can exercise this rule for issuance of Environmental Clearance Certificate to ensure industrial development compatible with living environment.

The Motor Vehicles Ordinance, 1983 and the Motor vehicle rules, 1997 can be exercised by the respective authorities to control emission of harmful gases and toxic metals from mechanized.

The conservancy section of the Paurashava will monitor the waste management system regularly and practice the 'Local Government (Paurashava) (Amended) Act, 2010' to make sure the management of solid waste disposal for better environment.

Preparation of regulations, strategy and plan documents is a requirement in most policy documents of the government. However, there are no modalities or guidelines to be followed after adoption and/or approval of a policy document. There is also no mechanism for monitoring the progress of implementation of policies within or outside the concerned Ministries. As a result, the sponsoring Ministry takes steps in their own ways of considerations.

Bangladesh is overwhelmingly dependent on environmental and natural resources, but the economic and societal forces at work coupled with other natural and technical factors, may have already seriously eroded the natural resource base of the country, which could have serious adverse impact on output, income and employment. In order to address these issues, the government has approved the National Environmental Management Action Plan in 1996. The National Environmental Management Action Plan was formulated through a massive consultative process involving grassroots workshops, regional workshops and professional and expert group workshops. The Plan has prioritized several actions on the environmental front and the government is in the process of creating a second-order priority list for immediate implementation of National Environmental Management Action Plan.

The action plan was prepared in four steps:

Step - i. Identification of the major concerns

Step - ii. Listing and synthesis of major issues (done in 1993).

Step -iii. Recommendations for actions based upon recommendations made by the peoples themselves as well as the professional groups and the government (done in 1994).

Step-iv. Prioritization of the actions based upon the views expressed by the people, professionals and government agencies.

14.8.2 Implementation, monitoring, Evaluation and Coordination of the Plan

It should be mentioned that implementation is the carrying out or execution of a plan. So in the implementation stage we should be particular about the monitoring, Evaluation and Coordination of the plan. The progress of project, the problems it is facing, the efficiency with which it is being implemented should be properly monitored and in the evaluation stage to be assess the extent to which the project produced the intended impacts. Moreover, coordination among different organizations and authority is also necessary. A monitoring and evaluation committee headed by the Mayor of the Paurashava should be formed for effective implementation, monitoring, evaluation and coordination of the plan.

Chapter 15

Plan for Urban Services

15.1 Introduction

The Urban Services element describes how the Paurashava maintains, improves, and provides adequate public services. Public services the city provides include water supply, sanitation, solid waste, telecommunication, electricity and gas supply.

One of the most important functions of the Urban Area Plan is to assure that adequate public facilities are provided to meet the needs of all people and developed lands within the city. To ensure a high quality of life, existing facilities must be maintained and improved. In addition, expanding these public services and facilities is necessary for urban development and economic growth. A complete range of public utilities is available to support urban development.

This section of the chapter describes the urban services development proposals for future development of the Kalaroa Paurashava. The proposals have been made at the town level, that is, the area under the urban area plan. The local level development proposals will be addressed in the Ward Action Plan. The environmental conditions throughout most of the urban areas are very poor. Improvement in the delivery of these services will require significant changes in current practices, strategies and availability of investment funds.

The Plan seeks to create a resource management approach that maintains a high environmental quality while providing for the development, use, maintenance and upgrading of urban services to meet the reasonable needs of the urban population of Kalaroa Paurashava.

15.2 Range and Content of the Urban Services

Urban services contents a number of items which are often confused or over lapping with Public Utilities and Community services. However, the following are the Urban Services:

- Water supply
- Sanitation
- Telecommunication
- Electricity and
- Gas supply

15.3 Analysis of Existing Condition and Demand for Services

15.3.1 Introduction

One of the major challenges in the urban sector is the promotion of planned growth of individual towns irrespective of its size. It is necessary to evolve an institutional arrangement to undertake planning exercises in each urban center. The physical development of each individual town should be planned to embody efficiency, productivity, beauty and environmental sustainability. Efficiency is related to functional aspects of towns

to be achieved through physical planning and providing basic urban services with emphasis on equity. Considering the total area and population, the level of urban services of Kalaroa Paurashava is unsatisfactory and do not fulfill the demand.

15.3.2 Analysis and projection on existing and proposed Urban Services

a) Analysis of existing urban services

Analysis of existing urban services such as Water supply, Sewerage, Electricity, Gas supply, Solid waste, Telephone etc. are listed below:

Water Supply

There is no water supply network for distribution of safe drinking water to its inhabitants of Kalaroa Paurashava. The water table within the Paurashava ranges from 6 ft to 22 ft and is lower during the summer. Kalaroa Upazila falls within the river basin of the Padma that serves for good recharge of the ground water. As a result, the inhabitants of the Paurashava do not face any difficulty of getting drinking water from hand tube wells in summer. The water supply within the Paurashava is by hand tube wells. 100% people of the Paurashava uses hand tube wells as source of drinking water. The DPHE and CARE are working with other NGOs for investigating drinking water quality of hand tube wells. They collect water samples from both newly constructed as well as in operation hand tube wells for investigating the arsenic level and other minerals of ground water. However, within the Paurashava any arsenic contaminated hand tube well not yet identified. Nevertheless, the Paurashava nor the DPHE has any record of how many hand tube wells are within the Paurashava at present. Most of the poor people in urban periphery has no hand tube well of their own. They use pond water for household purpose and collect water from neighbors' hand tube wells for drinking purpose.

Sewerage and Sanitation

Kalaroa Paurashava has no sewerage network, only there are few sanitary latrines with septic tank and soak pit. According to Socio-economic, it is about 49.70% households were lacking the sanitation facilities; 30.60% households had hygienic sanitation facilities and 19.70% households were under insanitary sanitation practices. As per the information given from Kalaroa Paurashava Authority, the Paurashava up to December, 2008 had distributed sanitary equipment to 2251 families out of the families deprived of sanitation facilities. Such an incentive has brought the percentage of hygienic sanitation practices up to 63.60% from 19.70%. But, still it is about 16.60% inhabitants lack the sanitation facilities. The DPHE and Paurashava are the main implementing agencies for sanitation projects whereas the UNICEF, WORLD VISION, BRAC, Proshika, etc. are the co-partners in different sanitation programs.

Electricity

The Rural Electrification Board (REB) is assigned for the supply of electricity to Kalaroa Paurashava. The Power Development Board (PDB) is absent here. The Area Office of the Pally Biddut Shamity (PBS) is responsible for distribution of electricity to the Kalaroa Paurashava. The PDB has so far given 384 No commercial connections to different shops, offices, services etc., 118 No connections to rice mills, saw mills, ice cream factories and other cottage industries, 54 connections to agricultural equipments and 2112

No. connections to its holdings within the Paurashava. During winter demand is higher when cottage industries and agricultural equipments are in operation. Moreover, the supply is not uninterrupted. Load shading is a common problem. The main constrains for new connections are deficiency in supply and lack of distribution line.

Gas supply

The natural gas supply has not yet brought in Kalaroa Paurashava. People use mainly firewood for cooking purpose as the fire wood is cheaper and more available in market. However, the rolled stick made from paddy husk as a substitute of firewood also is becoming more popular now days. A small percentage of people mostly of elite classes use liquefied petroleum gas (LPG) for cooking. The vehicles use diesel and petrol as fuel which are mainly sold from small roadside shops. There is no petrol pump within Kalaroa Paurashava area.

Telephone

The Bangladesh Telecommunication Company Limited (BTCL) the only land telephone service provider in Kalaroa Paurashava. The Grameen Phone, City Cell, Bangla Link, and Robi are the mobile phone companies operating in Kalaroa Paurashava. The BTCL has 256 line capacity digital telephone exchanges and it has so far provided 150 connections.

b) Projected Urban Services

An overview on projection of urban services such as Water supply, Electric substation, Gas, Solid waste disposal site and Telephone exchange are given below:

For forecasting demand for utility services an appropriate method is chosen based on the nature of the data available and the desired nature and level of detail of the forecasts. An approach often used is to employ more than one method and then to compare the forecasts to arrive at a more accurate forecast. There are several methods used worldwide for forecasting utility services (e.g. water supply, electricity) demand. But these methods are not applicable due to the lack of data. There are more techniques used for forecasting demand for other utility services but not applicable to the project context. So, it is better to predict demand of utility services using planning standard. According to 'Planning Standard' of Upazila Towns Infrastructure Development Project, provide by LGED; one acres of area is required for per 20000 populations. On the other hand, projected population of Paurashava for the year 2031 will be 34524 persons. Maintaining the ratio of distribution according to planning standard, 1.53 acres of land will be required for water supply system to meet up the demand. Following table shows demand of utility services, which have been calculated considering both the planning standard and projected population (Table 15.1).

Table 31.1: **Projected Urban Services**

Urban Services (utilities)	Projected Area Under Urban Services (in acre) for 2021
Telephone Exchange	0.77
Electric Sub Station	1.53
Water Supply	1.53
Gas	1.53
Garbage Disposal	10.00
Waste Transfer Station	0.75
Total	16.11

15.4 Proposals for Urban Services and Implementation Strategies

15.4.1 Introduction

The purpose of urban service plan is to provide information about the actual and forecast the future development of urban services. In this section a details proposal and implementation strategies for urban services are incorporated.

15.4.2 Proposals for Urban Services

Proposal for Water Supply

According to Ground Water Zoning Map of Bangladesh, the Ground Water Level of Kalaroa Paurashava is 5.3m-7.6m during dry season (BADC, 2010).

As the Paurashava has no connections to its residents, so to meet the domestic water requirement of the inhabitants of Paurashava a deep tube well is proposed with proper surface water treatment. In this regard, the population of 2031 (34524) is considered. The capacity of a deep tube well is assumed to be 50 liter/sec for average aquifer condition and pumping hour of Deep Tube Well to be 12 hrs/day. According to Human Development Report of UNDP, domestic water requirement is assumed to be 46 lpcd (UNDP, 2006). To forecast the daily domestic water requirement of the Paurashava, following method is used.

Calculation:

Per-capita Water Consumption	: 46 liter/capita/day
Discharge rate of DTW	: 50 liter/sec
Projected Population of Kalaroa Paurashava in 2021	: 34524 person
Amount of Water needed by projected population	: (46x30672) liter/day
	= 1588104 liter/day

Deep tube well needed to meet the requirement of the projected population

= 1410912 / (50x3600x12) nos.

= 0.74 nos. ≈ 1 nos.

According to Paurashava, the minimum level of ground water is 25ft. - 30ft. at dry season and the ground water contains very high iron at the level from 60ft. to 200ft. Ground water at a depth of above 200ft. is good enough in terms of both quality and quantity to meet the requirement of domestic water supply of the Paurashava.

Proposal for Sewerage

To install and maintain the sewerage network involves huge cost and it also encompass massive technical support, so the respective authorities are not capable of bearing such expenditure and it is unrealistic.

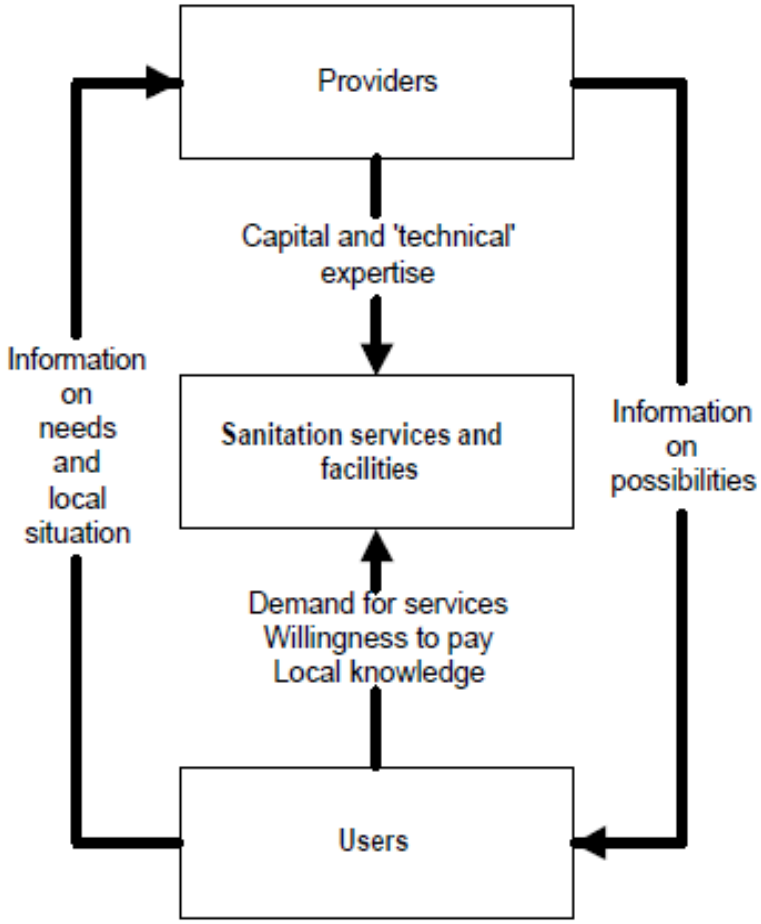

Figure 31.1: Strategies for Sanitation Improvement

Proposal for Sanitation

Sanitation can be defined as a system for promoting sanitary health conditions. The goal of environmental sanitation should be to ensure that people lead healthy and productive lives and the natural environment is protected. Increased funding for the Paurashava may succeed in implementing effective sanitation programs.

In order to provide sanitation facilities two broad approaches can be undertaken. One approach is to focus on supply - what the providing organization can deliver. The second is to base actions on what people want, in other words on their demand for services.

As only 30% sanitary latrine is pucca and only 19.70% latrine is semi-pucca, so proper sanitation facility should be offered by the Paurashava authority along with other NGO's by following the strategies of sanitation development.

The provision of public toilet is also an important issue for ensuring sanitation facility to the people outside residence. Seven public toilets are proposed at different location of the Paurashava, listed in **Table 15.2**. Public toilet should be designed as gender friendly in order to address the gender issues along with introducing written signs or pictograms of a man and a woman.

Table 31.2: List of Proposed Public Toilet

Sl. No.	Type	Location	Ward No.	Area (acre)
PT-01	Public Toilet	Beside Bus Terminal	Ward 1	0.026
PT-02	Public Toilet	Beside Upazila Complex Park	Ward 1	0.014
PT-03	Public Toilet	Beside Betraboti river at Bazaar area	Ward 2	0.029
PT-04	Public Toilet	Grameen bank at Bazaar area	Ward 3	0.017
PT-05	Public Toilet	Near Cold Store Road at Jhikra	Ward 3	0.016
PT-06	Public Toilet	Beside Betraboti river at Gopinathpur	Ward 6	0.013
PT-07	Public Toilet	In Morarikathi Road	Ward 7	0.027
PT-08	Public Toilet	Near Sapla Cinema Hall	Ward 8	0.016

Proposal for Electricity

The main constraints for electricity connection are deficiency in electricity supply and lack of distribution line to each household. The PDB Office informed that within Paurashava the demand is 60 connections per month. The supply of electricity ranges from 2.00 to 2.50 Mega Watt. During winter, demand is higher when cottage industries and agricultural equipments are in operation. To solve this particular problem the Paurashava authority can encourage the inhabitants to use solar energy as an alternative and environment friendly source of electricity instead of grid-based electricity supply. Solar energy is of two categories, one is thermal energy used for heating, cooling, drying and refrigerating etc. and another is photovoltaic energy. This energy can be utilized in any location in Bangladesh. It depends on the availability of sun-ray. Solar energy may be used for generating electricity from few watts to hundreds of thousands watts ignoring the presence of conventional energy and can be interlinked with the conventional system easily. Therefore, it can be generated at any location like market, bazaar, and Paurashava complexes away from the grid and can be used there. Awareness building program should be introduced in this respect.

On the other hand, most of the time the inhabitants face higher load-shedding and low voltage in electricity supply, which disrupt the water demand for irrigation. By ensuring stabilized voltage and providing new connections to the developing areas this problem should be overcome.

Improvement of Electricity

For the improvement of electricity, we are suggesting the following two options:

1) Electric supply: In Kalaroa Paurashava most of the time the inhabitants face higher load-shedding and low voltage in electricity supply, which disrupt the house hold activities, industrial production and water demand for irrigation. By ensuring stabilized voltage and providing new connections to the developing areas this problem should be overcome.

2) Solar energy: To solve this particular problem the Paurashava authority can encourage the inhabitants to use solar energy as an alternative and environment friendly source of electricity instead of grid-based electricity supply. Solar energy is of two categories, one is thermal energy used for heating, cooling, drying and refrigerating etc. and another is photovoltaic energy. This energy can be utilized in any location in Bangladesh. It depends on the availability of sun-ray. Solar energy may be used for generating electricity from few

watts to hundreds of thousands watts ignoring the presence of conventional energy and can be interlinked with the conventional system easily. Therefore, it can be generated at any location like market, bazaar, Paurashava complexes away from the grid and can be used there. Awareness building program should be introduced in this respect.

Improvement of Street Light

Street light is the responsibility of Paurashava. The Paurashava should take a program for street light on the major roads of core area and built up urban area. Major advantages of street lighting includes: prevention of accidents and increase in safety. Furthermore, lighted intersections and highway interchanges tend to have fewer crashes than unlighted intersections and interchanges. The major criticisms of street lighting are that it can actually cause accidents if misused, and cause light pollution. Occasionally the loss of night vision because of the accommodation reflex of drivers' eyes is the greatest danger. It is not uncommon for street lights to be on posts which have wires strung between them, such as on telephone poles or utility poles.

Proposal for Gas supply

There is no natural gas supply in Kalaroa Paurashava and the government has not yet undertaken any policy framework to supply natural gas to this Paurashava.

Proposal for Telephone

The demand of land telephone is decreasing in Kalaroa Paurashava due to rapid expanding of mobile phones.

Map 31.1: Utility Services Map of Kalaroa Paurashava

15.4.3 Regulations to address the proposals

15.4.3.1 Water Supply and Sanitation

The Paurashava Authority should regulate the establishment of Deep Tube-well and they will ensure the water quality, surface water treatment and proper networking system through experts to meet the need of Paurashava inhabitants. The respective authority can practice 'Water Supply and Sanitation Rule, 2009' to implement the water supply network and sanitation facility, which covers both the application process for water supply and method of distribution to the inhabitants. On the other hand, the Paurashava Authority should practice the 'Local Government (Paurashava) (Amended) Act, 2010' to ensure continuous water supply to its inhabitants.

To regulate the sanitation policy the following ideas should be considered.

- People from the various organizations and groups that are involved in sanitation are brought together to consider their needs and possible responses to those needs
- What people have done for the mselves will be much more effective than talking about the benefits of participatory approaches.
- Disagreements on approaches and standards should be resolved by testing the various options.

15.4.3.2 Electricity

The Paurashava authority can practice 'Electricity (Amendment) Act, 1993 (Act No.XXVIII of 1993)' to meet the demand of electricity supply, which covers both the application procedure for electricity supply and the process of distribution to the inhabitants.

Streetlights

The Paurashava Authority should practice the 'Local Government (Paurashava) (Amended) Act, 2010' to provide the streetlights in the Paurashava.

15.4.4 Implementation, monitoring and Evaluation of the Urban Services Plan

With regards to plan implementation strategy monitoring and evaluation is a very important part of plan implementation. Monitoring helps check if the plan is being implemented properly. It also measures the level of implementation of the plan. If the plan implementation is not on track, corrective measures can be taken to put execution on the track. After expiry of any plan evaluation is made about the errors and omissions. Such evaluation helps take corrective measures in the next plan. Such monitoring and evaluation must be carried out from within the Paurashava. But Kalaroa Paurashava is not equipped with qualified manpower to make such evaluation. For urban services plan monitoring and evaluation is essential. Qualified and experienced professionals of concerned departments should overlook the process of urban services. The Paurashava should have built its own capacity to ensure urban services to the inhabitants.

Chapter 16

Ward Action Plan

The third tier of the preparation of Master Plan of Kalaroa Paurashava is Ward Action Plan. The Ward Action Plan prepared under the framework of Structure Plan and Urban Area Plan. The Action Plans is undertaken for each of the nine wards of the Kalaroa Paurashava. This plan mainly describes the development proposals in detail as well as the prioritized schemes in the light of higher-level plan (Urban Area Plan).

16.1 Backgraoud

Ward Action Plan is a vital part of the Master plan package as far as spatial development and development control is concerned. Absence of Ward Action Plan not only hampers undertaking development projects but also leads to uncontrolled and unwanted spatial development. The Ward Action Plan enables detailed view of proposed land use and development for Kalaroa Town for a period of 5 (five) years with keeping in view the need over a time span of 20 years.

The provision of Ward Action Plan is inherent in the Structure Plan with some specific purposes. These are:

a. Provide basic micro level infrastructure and services in the study area through systematic planning, under the framework of Structure Plan.

b. Create congenial environment to promote economic activities.

c. Improve drainage system and protect natural water channels from encroachment.

d. Create service centers to promote urban growth.

16.1.1 Content and form of Ward Action Plan

The WAP will be the smaller units of Structure Plan, expose their problems and opportunities and propose development proposals for improve of the problems as well as to promote development. Combining the areas of common use enables putting them into future uniform land use. Within the Paurashava area one ward has been considered a WAP. The WAP ensures better management of planning and development. The following indicators needed to adopt in preparation of the WAP. These are:

a) Area of Ward, b) Physical Boundary, c) Road Networks, d) Population Growth and density, e) Landuse pattern and f) Potentiality & development opportunity.

The Ward Action Plan has been contained list of priority schemes for the development of roads, drains, traffic management and other social infrastructures for implementation during the first five years of plan period. It also contains the phasing of proposals and the means of implementation. The Proposals Map show where the policies and proposals apply.

In addition to indicating the priorities, a Ward Action Plan includes proposals identified by other Agencies and bodies expected to happen within the period of the Plan. However,

any dates and costs shown against proposals are liable to change as programs and the availability of resources are revising annually.

16.1.2 Linkage with the Structure and Urban Area Plan

The Ward Action Plan is the third tier planning of the Master Plan project. As WAP has been prepared within the policy framework of the Structure Plan and guidelines of Urban Area Plan and aims to take immediate action up to five years.

The planning components of the current plan package are hierarchically related with each other. Structure Plan is at the apex level providing the long term policies and strategies for urban development. The subsequent plans that is Urban Area Plan and Ward Action Plans are prepared under the strategic and visionary guidelines of the Structure Plan. Urban Area Plan is the mid-level plan meant for the main city and the potential areas in its vicinity likely to be developed in near future. Visions and strategies expressed in the Structure Plan are translated into planning proposals in the Urban Area Plan. It is also used for development control. Ward Action Plan is the lowest level in the planning hierarchy that shows the Urban Area plan proposals and beyond. It includes development proposals at the micro level reflecting the local needs and aspirations. Detailed Area Plans also follow the proposals and guide lines of the Structure Plan and Urban Area plan.

16.1.3 Approach & Methodology

The Ward Action Plan will be guided by the policies and proposals of upper level plans that is structure plan and urban area plan. Ward Action Plan provides guidance for development where action is expected in the term and covers individual parts of a city within a variable time frame. It comprises high priority projects and programs that can be implemented in a relatively short time period, in an intensive manner.

Ward Action Plan has been directed to the situations of local area and linked to the specific problems and issues of the area have been identified after discussion with and participatory process of all the stakeholders and beneficiaries of envisaged development in the area. A program of prospective facilities and uses has been detailed out indicating target populations, service levels, financing mechanism and implementations schedules.

The methodology could be illustrated through tri-step process for the assessment of Ward Action Plan (**Figure-16.1**). These three steps are:

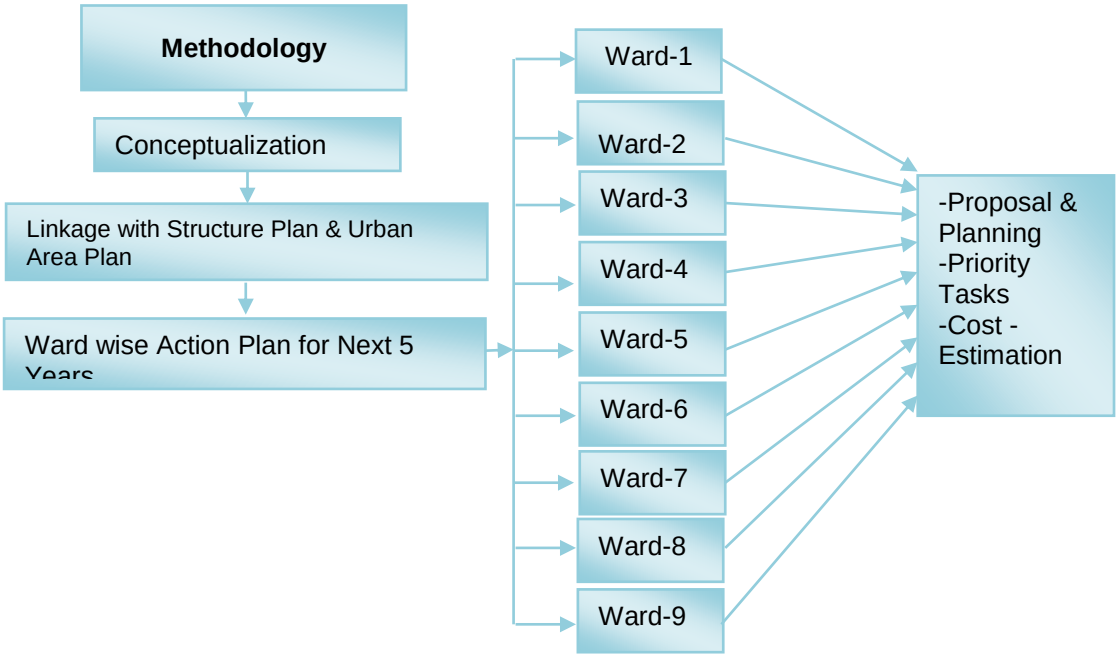

Figure 33.1: **Methodology of Ward Action Plan Preparation**

The first step of the methodology of Ward Action Plan is to conceptualize the content and background of the plan. In the next step, the linkage with Structure Plan & Urban Area Plan is identified. The final phase of the study is to adopt ward action plan in details. The proposal and planning, priority tasks and cost estimation are incorporated here to get a pictorial view of the Ward Action Plan.

16.2 Derivation of Ward Action Plan

16.2.1 Revisiting of Structure Plan

Structure Plan is a broad, indicative and open ended plan that contains broad policy framework for further plans and development actions. Based on the Structure Plan policy framework elaborate development proposals are prepared at subsequent lower levels.
The Structure Plan for Kalaroa Paurashava will provide a long term development strategy for 20 years up to 2031 for the development of the Paurashava area of 14.878 sq km or 3676.448 acres with an estimated population around 34524. The Structure Plan area was subdivided into 9 Ward Action Plans (WAPs) on the basis of ward boundary which had been considered as WAP at the lowest tier plan of this plan package. The Structure Plan covers:

- Identifies the order of magnitude and the direction of anticipated urban growth and definition of a broad set of policies considered necessary to achieve the overall plan objectives,
- Identifies areas where growth is likely to take place in future and addresses the major issues.
- is an attempt to provide a longer term perspective that would cater to the long term needs of the projected population and
- To determine the land use pattern of the town. It marks the possible areas of future expansion.

- Provides a policy framework for future development trends.

The Structure Plan contains policies on the following topics:

- Urban Area Development
- Transport and Communication
- Sanitation and Drainage
- Water Supply
- Solid Waste Management
- Industrial and Commercial Development
- Housing
- Economy and Employment
- Tourism and Recreation
- Environment
- Conservation of Heritage

The issues under each of the above topics have been briefly discussed followed by policy recommendations along with justification and agencies responsible for implementation.
The Structure Plan will remain valid for a period of 20 years from 2011 to 2031. From the beginning of 2028 a project will have to be started to prepare a new Structure Plan for the next 20 year plan period.

16.2.2 Revisiting of Urban Area Plan

The UAP has been prepared within the policy framework of the Structure Plan and aims to attain the overall project objectives. So there is a hierarchical relationship between the two.

The concept of this plan focuses on the basis of an urban area plan, where mid term (up to the year 2031) development strategy is generally focused in the development planning process. Urban area Plan attempts to guide and accomplishing a coordinated, adjusted, and harmonious development of an urban center and its environs in accordance with present and future needs, best promoting health, safety, morals, order, convenience, property, general welfare, as well as efficiency and economy in the process of development; the forecast of a town's future. This plan is the second hierarchy of the current planning package and guided by the policy proposals of the structure plan. The Plan contains-

- broad spatial proposals and land use shown on map of desired scale;
- written statement about land use proposals;
- description of social-economic and environment policies;
- Sector specific plans and proposals and development standards.

16.2.3 Prioritization

Urban infrastructure Development Scheme for Paurashava aims at improvement in urban infrastructure in a planned manner.

The objectives of the scheme are to-

a) Improve infrastructural facilities and help create durable public assets and quality oriented services in Paurashava

b) Enhance public-private-partnership in infrastructural development and

c) Promote planned integrated development of Paurashava.

The components for assistance under the scheme will include all urban infrastructure development projects. The Scheme will cover the following areas

- Construction/ Up gradation of roads, highways/expressways
- Water Supply
- Solid Waste Management
- Construction and improvement of drains/storm water drains
- Parking lots/spaces on Public Private Partnership basis
- Development of heritage areas
- Preservation of water bodies.
- Health and educational institutions

On completion of the Scheme period of five years, it is expected that Paurashava will achieve the following outcomes

(a) Modern and transparent budgeting, accounting, financial management systems, designed and adopted for all urban services and governance functions

(b) City-wide framework for planning and governance will be established and become operational

(c) All urban residents will be able to obtain access to a basic level of urban services

(d) Financially self-sustaining agencies for urban governance and service delivery will be established, through reforms to major revenue instruments

(e) Local services and governance will be conducted in a manner that is transparent and accountable to citizens

(f) E-Governance applications will be introduced in core functions of Paurashava resulting in reduced cost and time of service delivery processes.

16.2.4 Ward wise Action Plan for next five years

The Ward Action Plan is spanning for the 5 years period. The Structure Plan paints the broad picture on the future pattern of housing, jobs, transport, services and the environment. Ward Action Plan is much more specific. They tackle the problems and opportunities associated with individual communities and show exactly where it apply.

The purpose of a Ward Action Plan is to -

- guide decisions made on planning applications to ensure that new developments are right for their location;

- help plan for the integrated develo2pment needs of an area such as new homes, factories, shops and schools;
- provide a consistent spatial framework within which both private and public sector investment decisions can be taken;
- protect important natural and man-made heritage features; and, most importantly, allow local people to become involved in the planning process

Ward Action Plans are developed to provide locally focused planning guidance for local areas. WAP aim to achieve the following:

- establish a shared vision for the local area
- address key local planning issues and capitalize on opportunities
- establish an integrated approach to local planning and
- sensibly manage future development outcomes

A WAP can override other parts of the planning Scheme where an inconsistency exists. A Ward Action Plan is prepared with the input from many stakeholders. Some of these are:

- the local and wider community;
- Prominent land owners, businesses, residents', associations, community groups and nongovernment organizations;
- elected representatives of council (councilors) and other levels of government; and
- Representatives of relevant council programs and state government agencies

Public involvement is a key issue. To this end, the Paurashava has adopted a "Planning for Real" based approach which allows hands-on participation by all the residents of each local community. They help by identifying local issues and problems which the Plan can tackle; expressing their views on the Paurashava's policies; and suggesting how these could be improved. Ward Action Plan must be topical and relevant. The Paurashava's target is to ensure that they are reviewed on a 5 yearly cycle.

16.3 Ward Action Plan for Ward 01

16.3.1 Demography

As per the BBS 2011, this Ward had a population of 3222 persons. Population projection shows 4082 population for the year 2031. For the same year, it has a density of about 08 persons per acre (ppa) and it will be 11 ppa in 2031. The following table shows the details.

Table 33.1: Population Statistics of Ward No. 01

Item	Year	
	2011	2031
Area (acre)	388.37	388.37
Population	3222	4082
Density of Population (per acre)	8	11

16.3.2 Critical Issues and Opportunities of the Ward

Ward no.1 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 8 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.3.3 Proposals and Plans for Ward 01

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of Ward 01 for. Ward Action Plan Map for Ward 01 is shows in **Map 16.1**.

Table 33.2: **New Land Development Proposal (DP) of Ward No. 01**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
LIH	Low Income Housing	Near Jessore-Satkhira Road in Tulshidanga	Ward 1	12.466	Tulshidanga_59_01	275-277, 305-310, 319, 327-341, 358, 359, 492, 493, 495-516, 546, 895
PT-01	Public Toilet	Beside Bus Terminal	Ward 1	0.026	Tulshidanga_59_01	298
PT-02	Public Toilet	Beside Upazila Complex Park	Ward 1	0.014	Tulshidanga_59_02	1717
SM-01	Super Market	Beside ASA Office	Ward 1	0.850	Tulshidanga_59_02	1674, 1675, 1677-1680
TS-01	Tempo Stand	Beside Tulshidanga Pashchimpara Jame Mosque	Ward 1	0.258	Tulshidanga_59_01	702, 704
TT	Truck Terminal	Near Shake Aman Ullha Degree College	Ward 1	0.975	Tulshidanga_59_01	277, 281, 282
WC-01	Ward Center	Beside Medical Road	Ward 1	0.386	Tulshidanga_59_01	867-870

Map 33.1: Land Use Plan Map for Ward No. 01

16.3.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.3: Widening and New Road Development Proposal in Ward No. 01

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
1	LR_N_01	Local Road	20 ft	New Construction	0.36
1	TR_N_05	Tertiary Road	30 ft	New Construction	0.68
1	TR_W_01	Tertiary Road	30 ft	Widening	0.27
1	TR_W_02	Tertiary Road	30 ft	Widening	0.31
1	TR_W_03	Tertiary Road	30 ft	Widening	0.39
1	TR_W_04	Tertiary Road	30 ft	Widening	0.22
1	PR_W_08	Primary Road	80 ft	Widening	0.42
1	TR_W_33	Tertiary Road	30 ft	Widening	0.33
1	SR_W_11	Secondary Road	40 ft	Widening	0.70
1, 2, 3, 5, 6	PR_W_02	Primary Road	60 ft	Widening	2.86
1, 2, 4, 8, 9	PR_N_02	Primary Road	100 ft	New Construction	4.33
1, 2, 9	SR_N_06	Secondary Road	40 ft	New Construction	1.39
1, 3	PR_W_01	Primary Road	60 ft	Widening	1.24
1, 3, 4, 5, 6	PR_N_01	Primary Road	120 ft	New Construction	6.36
Total					**19.86**

16.3.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.4: Proposed Drainage Development Plan Proposals for Ward No. 01

Drain Type	ID	Width (m)	Outfall	Length (m)
Primary Drain	PD-01	1.524	Betraboti River	741.09
	PD-02	1.524	Betraboti River	724.53
	PD-03	1.524	Betraboti River	1223.30
Secondary Drain	SD-01	0.762	Betraboti River	957.58
Total				**3646.5**

16.3.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.5: Proposed Priority Tasks for Ward No. 01

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	PT-01	Development Proposal	PT-02	Development Proposal	-
Road	LR-03, 05, 06	Road	LR-04, 08, 09	Road	SR-02, 03
Drain	PD-01, 02	Drain	SD-01	Drain	PD-03

Map 33.2: Proposed Road, Drainage and Utility Services Plan (Ward No. 01)

16.4 Ward Action Plan for Ward 02

16.4.1 Demography

As per the BBS 2011, this Ward had a population of 3910 persons. Population projection shows 4954 population for the year 2031. For the same year, it has a density of about 14 persons per acre (ppa) and it will be 18 ppa in 2031. The following table shows the details.

Table 33.6: Population Statistics of Ward No. 02

Item	Year	
	2011	2031
Area (acre)	275.59	275.59
Population	3910	4954
Density of Population (per acre)	14	18

16.4.2 Critical Issues and Opportunities of the Ward

Ward no. 02 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 14 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.4.3 Proposals and Plans for Ward 02

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 02** for implementation. Ward Action Plan Map for Ward 02 is shows in **Map 16.3**.

Table 33.7: **New Land Development Proposal (DP) of Ward No. 02**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
NM-01	Neighborhood Market	Near Tulshidanga Mondir	Ward 2	1.059	Tulshidanga_59_02	1383, 1385, 1386, 1392, 1395-1410, 1413-1416, 1419
NP-01	Neighborhood Park	Beside Mosjid-E-Uusman Al-solaiman	Ward 2	1.273	Tulshidanga_59_02	1216-1222
PT-03	Public Toilet	Beside Betraboti river at Bazaar area	Ward 2	0.029	Jhikra_60_01	64
SH	Slaughter House	Beside Fish market	Ward 2	0.816	Jhikra_60_01	109, 110, 112, 114
WC-02	Ward Center	Beside Kolshidanga Kali Mondir	Ward 2	0.182	Tulshidanga_59_02	1766, 1767
WDG	Waste Disposal Ground	North corner of the Pourashava	Ward 2	5.679	Tulshidanga_59_02	1029-1031, 1034, 1035
WM	Wholesale Market	Beside Jessore-Satkhira Road and Shake Aman Ullha Degree College	Ward 2	4.887	Tulshidanga_59_02	1185, 1266, 1271-1281, 1283-1288

Map 33.3: Land Use Plan Map for Ward No. 02

16.4.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.8: Widening and New Road Development Proposal in Ward No. 02

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
2	LR_N_05	Local Road	20 ft	New Construction	0.33
2	SR_W_01	Secondary Road	40 ft	Widening	1.16
2	TR_W_05	Tertiary Road	30 ft	Widening	0.73
2	TR_W_06	Tertiary Road	30 ft	Widening	0.37
2	TR_W_07	Tertiary Road	30 ft	Widening	0.35
2	TR_W_08	Tertiary Road	30 ft	Widening	0.22
2	LR_W_02	Local Road	20 ft	Widening	0.26
2	TR_W_09	Tertiary Road	30 ft	Widening	0.23
2	SR_W_02	Secondary Road	40 ft	Widening	0.90
2	SR_W_03	Secondary Road	40 ft	Widening	0.19
2	SR_W_04	Secondary Road	40 ft	Widening	0.82
2	LR_W_03	Local Road	20 ft	Widening	0.11
2	TR_W_10	Tertiary Road	30 ft	Widening	0.29
2	LR_W_04	Local Road	20 ft	Widening	0.07
2	SR_W_12	Secondary Road	40 ft	Widening	0.42
2, 5, 6	LR_N_02	Local Road	20 ft	New Construction	5.31
2, 8	TR_W_11	Tertiary Road	30 ft	Widening	0.33
2, 8, 9	SR_W_16	Secondary Road	40 ft	Widening	0.61
Total					**12.70**

16.4.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.9: Proposed Drainage Development Plan Proposals for Ward No. 02

Drain Type	ID	Width (m)	Outfall	Length (m)
Secondary Drain	SD-02	0.762	Khal	386.13
Tertiary Drain	TD-06	0.457	Betraboti River	291.53
	TD-07	0.457	Betraboti River	176.07
	TD-08	0.457	Betraboti River	136.70
Total				**990.43**

16.4.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas

with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.10: Proposed Priority Tasks for Ward No. 02

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	NP-01	Development Proposal	PT-03	Development Proposal	SH
Road	LR-12, 13, 16, 19, 22	Road	LR-17, 24	Road	LR-11, 18
Drain	TD-06	Drain	TD-07	Drain	TD-08

Map 33.4: Proposed Road, Drainage and Utility Services Plan (Ward No. 02)

16.5 Ward Action Plan for Ward 03

16.5.1 Demography

As per the BBS 2011, this Ward had a population of 3916 persons. Population projection shows 4961 population for the year 2031. For the same year, it has a density of about 15 persons per acre (ppa) and it will be 19 ppa in 2031. The following table shows the details.

Table 33.11: Population Statistics of Ward No. 03

Item	Year	
	2011	2031
Area (acre)	267.58	267.58
Population	3916	4961
Density of Population (per acre)	15	19

16.5.2 Critical Issues and Opportunities of the Ward

Ward no. 03 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 15 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.5.3 Proposals and Plans for Ward 03

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 03** for implementation. Ward Action Plan Map for Ward 03 is shows in **Map 16.5**.

Table 33.12: **New Land Development Proposal (DP) of Ward No. 03**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
CP	Central Park	Beside Cold Store Road	Ward 3	8.102	Jhikra_60_01	352, 392-395, 397-413, 415-417, 425-429, 1172, 1173
					Jhikra_60_02	1436, 1437, 1440, 1441, 1444-1456, 1460, 1461
PA	Parking Area	Near Kalarowa GKMK Pilot High School	Ward 3	2.002	Jhikra_60_01	459-463
PT-04	Public Toilet	Beside Grameen bank at Bazaar area	Ward 3	0.017	Jhikra_60_01	234
PT-05	Public Toilet	Near Cold Store Road at Jhikra	Ward 3	0.016	Jhikra_60_01	432
SM-02	Super Market	Near Kalarowa GKMK Pilot High School	Ward 3	0.482	Jhikra_60_01	248, 269, 273
WC-03	Ward Center	Near Cold Store Road	Ward 3	0.511	Jhikra_60_01	428, 430-433, 442, 443
WTS-01	Waste Transfer Station	In Jhikra, near the core area	Ward 3	0.131	Jhikra_60_01	456, 458, 459, 461

Map 33.5: Land Use Plan Map for Ward No. 03

16.5.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.13: Widening and New Road Development Proposal in Ward No. 03

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
3	SR_N_01	Secondary Road	40 ft	New Construction	0.22
3	SR_N_02	Secondary Road	40 ft	New Construction	0.83
3	SR_N_03	Secondary Road	40 ft	New Construction	0.58
3	TR_N_01	Tertiary Road	30 ft	New Construction	0.56
3	TR_W_12	Tertiary Road	30 ft	Widening	0.56
3	TR_W_13	Tertiary Road	30 ft	Widening	0.61
3, 4	PR_W_03	Primary Road	60 ft	Widening	0.74
3, 4	TR_W_14	Tertiary Road	30 ft	Widening	0.31
Total					**4.41**

16.5.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.14: Proposed Drainage Development Plan Proposals for Ward No. 03

Drain Type	ID	Width (m)	Outfall	Length (m)
Primary Drain	PD-04	1.524	Betraboti River	567.44
Total				**567.44**

16.5.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.15: Proposed Priority Tasks for Ward No. 03

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	PA, PT-04	Development Proposal	WTS-01	Development Proposal	SM-02
Road	LR-30, 32, 33	Road	LR-27	Road	LR-31
Drain	PD-04	Drain	-	Drain	-

Map 33.6: Proposed Road, Drainage and Utility Services Plan (Ward No. 03)

16.6 Ward Action Plan for Ward 04

16.6.1 Demography

As per the BBS 2011, this Ward had a population of 1795 persons. Population projection shows 2274 population for the year 2031. For the same year, it has a density of about 08 persons per acre (ppa) and it will be 10 ppa in 2031. The following table shows the details.

Table 33.16: Population Statistics of Ward No. 04

Item	Year	
	2011	2031
Area (acre)	225.93	225.93
Population	1795	2274
Density of Population (per acre)	8	10

16.6.2 Critical Issues and Opportunities of the Ward

Ward no. 04 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 8 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.6.3 Proposals and Plans for Ward 04

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 04** for implementation. Ward Action Plan Map for Ward 04 is shows in **Map 16.7**.

Table 33.17: **New Land Development Proposal (DP) of Ward No. 04**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
VI	Vocational Institute	Beside Rucia Bekari	Ward 4	0.749	Jhikra_60_01	715, 717-721, 723
WC-04	Ward Center	Near BRAC school at Jhikra	Ward 4	0.502	Jhikra_60_01	760, 761
					Jhikra_60_02	1839

Map 33.7: Land Use Plan Map for Ward No. 04

16.6.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.18: Widening and New Road Development Proposal in Ward No. 04

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
4	SR_W_05	Secondary Road	40 ft	Widening	0.92
4	TR_W_15	Tertiary Road	30 ft	Widening	0.50
4	TR_W_16	Tertiary Road	30 ft	Widening	0.14
4, 5, 6	PR_W_04	Primary Road	60 ft	Widening	2.88
Total					**4.43**

16.6.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.19: Proposed Drainage Development Plan Proposals for Ward No. 04

Drain Type	ID	Width (m)	Outfall	Length (m)
Primary Drain	PD-04	1.524	Betraboti River	1003.36
Total				**1003.36**

16.6.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.20: Proposed Priority Tasks for Ward No. 04

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	-	Development Proposal	-	Development Proposal	VI
Road	-	Road	-	Road	-
Drain	PD-04	Drain	-	Drain	-

Map 33.8: Proposed Road, Drainage and Utility Services Plan (Ward No. 04)

16.7 Ward Action Plan for Ward 05

16.7.1 Demography

As per the BBS 2011, this Ward had a population of 2844 persons. Population projection shows 3603 population for the year 2031. For the same year, it has a density of about 08 persons per acre (ppa) and it will be 10 ppa in 2031. The following table shows the details.

Table 33.21: Population Statistics of Ward No. 05

Item	Year	
	2011	2031
Area (acre)	359.46	359.46
Population	2844	3603
Density of Population (per acre)	8	10

16.7.2 Critical Issues and Opportunities of the Ward

Ward no. 05 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 8 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.7.3 Proposals and Plans for Ward 05

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 05** for implementation. Ward Action Plan Map for Ward 05 is shows in **Map 16.9**.

Table 33.22: **New Land Development Proposal (DP) of Ward No. 05**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
IZ	Industrial Zone	Beside Jessore-Satkhira Road in Jhikra	Ward 5, 6	52.236	Gopinathpur_61_01	160, 182, 183, 1268
					Gopinathpur_61_02	216-231, 239-261, 263-284, 292-301, 304, 1276, 1278, 1279
					Jhikra_60_01	1092, 1114-1129, 1185, 1186, 1188
					Jhikra_60_03	2535, 2541-2544, 2547-2560, 2562-2565, 2569-2574, 2578-2599, 2637, 2689-2695, 2727-2730
St	Stadium	Near Jhikra Reg. Primary School	Ward 5	6.639	Jhikra_60_01	857, 929-936, 986-999, 1008, 1026-1030
WC-05	Ward Center	Near Jhikra Reg. Primary School	Ward 5	0.445	Jhikra_60_01	937-940, 943, 944

Map 33.9: Land Use Plan Map for Ward No. 05

16.7.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.23: Widening and New Road Development Proposal in Ward No. 05

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
5	TR_W_17	Tertiary Road	30 ft	Widening	0.24
5	SR_W_06	Secondary Road	40 ft	Widening	0.58
5	TR_W_18	Tertiary Road	30 ft	Widening	0.23
5	TR_W_19	Tertiary Road	30 ft	Widening	0.27
5	TR_W_20	Tertiary Road	30 ft	Widening	0.23
5	TR_W_21	Tertiary Road	30 ft	Widening	0.45
5	TR_W_22	Tertiary Road	30 ft	Widening	0.44
5, 6	LR_N_04	Local Road	20 ft	New Construction	0.14
5, 6	PR_N_04	Primary Road	80 ft	New Construction	1.06
5, 6	TR_W_23	Tertiary Road	30 ft	Widening	0.37
5, 8	TR_N_09	Tertiary Road	30 ft	New Construction	0.42
Total					**4.46**

16.7.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.24: Proposed Drainage Development Plan Proposals for Ward No. 05

Drain Type	ID	Width (m)	Outfall	Length (m)
Secondary Drain	SD-06	0.762	Betraboti River	700.77
Tertiary Drain	TD-23	0.457	Betraboti River	239.68
Total				**940.45**

16.7.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.25: Proposed Priority Tasks for Ward No. 05

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	-	Development Proposal	-	Development Proposal	-
Road	LR-37, 40, 44	Road	LR-38, 42	Road	LR-43
Drain	SD-06	Drain	TD-23	Drain	-

Map 33.10: Proposed Road, Drainage and Utility Services Plan (Ward No. 05)

16.8 Ward Action Plan for Ward 06

16.8.1 Demography

As per the BBS 2011, this Ward had a population of 3149 persons. Population projection shows 3990 population for the year 2031. For the same year, it has a density of about 07 persons per acre (ppa) and it will be 08 ppa in 2031. The following table shows the details.

Table 33.26: Population Statistics of Ward No. 06

Item	Year	
	2011	2031
Area (acre)	477.76	477.76
Population	3149	3990
Density of Population (per acre)	7	8

16.8.2 Critical Issues and Opportunities of the Ward

Ward no. 06 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 7 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.8.3 Proposals and Plans for Ward 06

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 06** for implementation.Ward Action Plan Map for Ward-06 is shows in **Map 16.11**.

Table 33.27: **New Land Development Proposal (DP) of Ward No. 06**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
FSS	Fire Service Station	Beside Jessore-Satkhira Road, near power house	Ward 6	1.693	Gopinathpur_61_02	770-775, 778, 845
Hos-01	Hospital	Beside Jessore-Satkhira Road	Ward 6	0.462	Gopinathpur_61_01	65-68
IZ	Industrial Zone	Beside Jessore-Satkhira Road in Jhikra	Ward 5, 6	52.236	Gopinathpur_61_01	160, 182, 183, 1268
					Gopinathpur_61_02	216-231, 239-261, 263-284, 292-301, 304, 1276, 1278, 1279
					Jhikra_60_01	1092, 1114-1129, 1185, 1186, 1188
					Jhikra_60_03	2535, 2541-2544, 2547-2560, 2562-2565, 2569-2574, 2578-2599, 2637, 2689-2695, 2727-2730
NM-02	Neighborhood Market	Beside Shuvo Das Tample at Gopinathpur	Ward 6	0.845	Gopinathpur_61_02	957, 958
NP-02	Neighborhood Park	Near Jessore-Satkhira Road in Murarikathi	Ward 6	0.866	Gopinathpur_61_02	980, 984, 985
PS	Primary School	Near Jessore-Satkhira Road in Gopinathpur	Ward 6	0.995	Gopinathpur_61_02	862, 866-868, 871
PT-06	Public Toilet	Beside Betraboti river at Gopinathpur	Ward 6	0.013	Gopinathpur_61_02	959
TS-02	Tempo Stand	Beside Jessore-Satkhira Road	Ward 6	0.292	Gopinathpur_61_01	71, 75, 133
WC-06	Ward Center	Near Shuvo Das Tample	Ward 6	0.387	Gopinathpur_61_02	961-963

Map 33.11: Land Use Plan Map for Ward No. 06

16.8.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.28: Widening and New Road Development Proposal in Ward No. 06

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
6	TR_N_02	Tertiary Road	30 ft	New Construction	0.44
6	TR_N_03	Tertiary Road	30 ft	New Construction	0.12
6	TR_N_04	Tertiary Road	30 ft	New Construction	0.33
6	PR_W_05	Primary Road	60 ft	Widening	1.01
6	SR_W_07	Secondary Road	40 ft	Widening	0.32
6	SR_W_08	Secondary Road	40 ft	Widening	1.18
6	SR_W_09	Secondary Road	40 ft	Widening	0.24
6	TR_W_24	Tertiary Road	30 ft	Widening	0.18
6	TR_W_25	Tertiary Road	30 ft	Widening	0.36
6	SR_W_10	Secondary Road	40 ft	Widening	1.13
6	TR_W_26	Tertiary Road	30 ft	Widening	0.19
6	TR_W_27	Tertiary Road	30 ft	Widening	0.17
6	TR_W_28	Tertiary Road	30 ft	Widening	0.23
6	TR_W_29	Tertiary Road	30 ft	Widening	0.20
6	TR_W_30	Tertiary Road	30 ft	Widening	0.11
6	LR_W_07	Local Road	20 ft	Widening	0.24
6, 7	SR_N_05	Secondary Road	40 ft	New Construction	0.38
6, 7	PR_W_07	Primary Road	60 ft	Widening	0.55
6, 7, 8	PR_N_05	Primary Road	100 ft	New Construction	1.79
Total					**9.19**

16.8.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.29: Proposed Drainage Development Plan Proposals for Ward No. 06

Drain Type	ID	Width (m)	Outfall	Length (m)
Primary Drain	PD-06	1.524	Betraboti River	949.62
Secondary Drain	SD-08	0.762	Betraboti River	294.03
	SD-09	0.762	Betraboti River	218.60
Tertiary Drain	TD-24	0.457	Betraboti River	388.25
	TD-25	0.457	Betraboti River	368.54
	TD-28	0.457	Betraboti River	213.40
	TD-30	0.457	Betraboti River	287.73
Total				**2720.17**

16.8.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of

compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.30: Proposed Priority Tasks for Ward No. 06

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	FSS, NM-02, PT-06	Development Proposal	Hos-02, TS-02	Development Proposal	NP-02
Road	LR-49, 54, 58	Road	SR-08, LR-60	Road	LR-48, 52
Drain	PD-06, SD-08, 09	Drain	TD-28	Drain	TD-24, 25

Map 33.12: Proposed Road, Drainage and Utility Services Plan (Ward No. 06)

16.9 Ward Action Plan for Ward 07

16.9.1 Demography

As per the BBS 2011, this Ward had a population of 3249 persons. Population projection shows 4116 population for the year 2031. For the same year, it has a density of about 03 persons per acre (ppa) and it will be 04 ppa in 2031. The following table shows the details.

Table 33.31: Population Statistics of Ward No. 07

Item	Year	
	2011	2031
Area (acre)	972.69	972.69
Population	3249	4116
Density of Population (per acre)	3	4

16.9.2 Critical Issues and Opportunities of the Ward

Ward no. 07 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 3 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.9.3 Proposals and Plans for Ward 07

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 07** for implementation. Ward Action Plan Map for Ward 07 is shows in **Map 16.13**.

Table 33.32: **New Land Development Proposal (DP) of Ward No. 07**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
HS	High School	Beside Betraboti river in Morarikathi	Ward 7	3.811	Murarikathi _62_03	5064-5076, 5081-5083, 5085, 5107, 6733, 6735, 6736, 6739
NM-03	Neighborhood Market	Beside Awami League Party Office at Murarikathi	Ward 7	1.294	Murarikathi _62_02	2088, 2157, 2160-2162, 2164, 2375
PT-07	Public Toilet	In Morarikathi Road	Ward 7	0.027	Murarikathi _62_02	2388
WC-07	Ward Center	Near Awami League Party Office	Ward 7	0.816	Murarikathi _62_02	2088-2091, 2155-2157
WTS-02	Waste Transfer Station	In Murarikathi	Ward 7	0.263	Murarikathi _62_02	2213-2215

Map 33.13: Land Use Plan Map for Ward No. 07

16.9.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.33: Widening and New Road Development Proposal in Ward No. 07

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
7	PR_N_03	Primary Road	80 ft	New Construction	2.69
7	SR_N_04	Secondary Road	40 ft	New Construction	0.87
7	TR_N_06	Tertiary Road	30 ft	New Construction	0.34
7	LR_W_05	Local Road	20 ft	Widening	0.26
7	TR_W_31	Tertiary Road	30 ft	Widening	0.36
7	TR_W_32	Tertiary Road	30 ft	Widening	0.35
7	LR_W_06	Local Road	20 ft	Widening	0.25
7	LR_W_08	Local Road	20 ft	Widening	0.18
7	LR_W_10	Local Road	20 ft	Widening	0.22
7	TR_W_34	Tertiary Road	30 ft	Widening	0.36
7	TR_W_35	Tertiary Road	30 ft	Widening	0.13
7	TR_W_36	Tertiary Road	30 ft	Widening	0.48
7	TR_W_37	Tertiary Road	30 ft	Widening	0.24
7	TR_W_38	Tertiary Road	30 ft	Widening	0.54
7	TR_W_39	Tertiary Road	30 ft	Widening	0.46
7	TR_W_40	Tertiary Road	30 ft	Widening	0.50
7	LR_W_11	Local Road	20 ft	Widening	0.16
7	SR_W_13	Secondary Road	40 ft	Widening	1.20
7	TR_W_41	Tertiary Road	30 ft	Widening	0.62
7	TR_W_42	Tertiary Road	30 ft	Widening	0.15
7, 8, 9	LR_N_03	Local Road	20 ft	New Construction	5.61
Total					**15.97**

16.9.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.34: Proposed Drainage Development Plan Proposals for Ward No. 07

Drain Type	ID	Width (m)	Outfall	Length (m)
Primary Drain	PD-07	1.524	Betraboti River	952.50
Secondary Drain	SD-10	0.762	Betraboti River	411.30
	SD-11	0.762	Betraboti River	837.52
Tertiary Drain	TD-31	0.457	Betraboti River	225.35
	TD-32	0.457	Betraboti River	384.78
	TD-33	0.457	Betraboti River	263.63
	TD-34	0.457	Betraboti River	407.09
Total				**3482.17**

16.9.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the

landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.35: Proposed Priority Tasks for Ward No. 07

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	WTS-02	Development Proposal	PT-07	Development Proposal	-
Road	LR-62, 68, 70, 72, 74	Road	LR-63, 64, 76, 77	Road	LR-69, 79, 80
Drain	PD-07, SD-10, 11	Drain	TD-31, 33	Drain	TD-32, 34

Map 33.14: Proposed Road, Drainage and Utility Services Plan (Ward No. 07)

16.10 Ward Action Plan for Ward 08

16.10.1 Demography

As per the BBS 2011, this Ward had a population of 2934 persons. Population projection shows 3717 population for the year 2031. For the same year, it has a density of about 06 persons per acre (ppa) and it will be 07 ppa in 2031. The following table shows the details.

Table 33.36: Population Statistics of Ward No. 08

Item	Year	
	2011	2031
Area (acre)	502.83	502.83
Population	2934	3717
Density of Population (per acre)	6	7

16.10.2 Critical Issues and Opportunities of the Ward

Ward no. 08 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 6 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.10.3 Proposals and Plans for Ward 08

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 08** for implementation. Ward Action Plan Map for Ward 08 is shows in **Map 16.15**.

Table 33.37: **New Land Development Proposal (DP) of Ward No. 08**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
NP-03	Neighbor hood Park	Beside Sri potipurModel Govt. Primary School	Ward 8	1.038	Murarikathi_ 62_01	88, 90, 94-100
NP-04	Neighbor hood Park	Beside Awami League Party Office at Murarikathi	Ward 8	1.460	Murarikathi_ 62_02	2040, 2042, 2043, 2079, 2080, 2085-2087, 4331
PT-08	Public Toilet	Near Sapla Cinema Hall	Ward 8	0.016	Murarikathi_ 62_01	25
RZ	Resettle ment Zone	Beside Satntro Ebtadai Madrasha at Morarikathi	Ward 8	7.966	Murarikathi_ 62_01	392-395, 398-404, 406, 408-414, 416-422, 424-429, 432, 433, 1070, 1072
WC-08	Ward Center	Beside BRAC school at Murarikathi	Ward 8	0.361	Murarikathi_ 62_01	234, 235, 239, 240

Map 33.15: Land Use Plan Map for Ward No. 08

16.10.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.38: Widening and New Road Development Proposal in Ward No. 08

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
8	LR_W_01	Local Road	20 ft	Widening	0.16
8	TR_N_07	Tertiary Road	30 ft	New Construction	0.52
8	TR_N_08	Tertiary Road	30 ft	New Construction	0.62
8	LR_W_09	Local Road	20 ft	Widening	0.24
8	TR_W_43	Tertiary Road	30 ft	Widening	0.47
8	SR_W_14	Secondary Road	40 ft	Widening	1.55
8	TR_W_44	Tertiary Road	30 ft	Widening	1.12
8	LR_W_12	Local Road	20 ft	Widening	0.26
8	TR_W_45	Tertiary Road	30 ft	Widening	0.90
8	TR_W_46	Tertiary Road	30 ft	Widening	1.27
8	TR_W_47	Tertiary Road	30 ft	Widening	0.15
8	SR_W_17	Secondary Road	40 ft	Widening	0.25
8, 9	SR_W_15	Secondary Road	40 ft	Widening	0.78
Total					**8.29**

16.10.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.39: Proposed Drainage Development Plan Proposals for Ward No. 08

Drain Type	ID	Width (m)	Outfall	Length (m)
Primary Drain	PD-08	1.524	Betraboti River	923.48
	PD-09	1.524	Betraboti River	744.66
Secondary Drain	SD-12	0.762	Khal	435.38
	SD-13	0.762	Betraboti River	283.65
	SD-14	0.762	Betraboti River	434.13
Tertiary Drain	TD-39	0.457	Betraboti River	249.24
	TD-40	0.457	Betraboti River	275.19
	TD-41	0.457	Betraboti River	190.18
Total				**3535.91**

16.10.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the

area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.40: Proposed Priority Tasks for Ward No. 08

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	NP-03	Development Proposal	PT-08	Development Proposal	NP-04
Road	LR-84, 86, 87, 88	Road	LR-91, 92, 96	Road	LR-83, 95
Drain	PD-08, 09	Drain	SD-12, 13, 14	Drain	TD-39, 40, 41

Map 33.16: Proposed Road, Drainage and Utility Services Plan (Ward No. 08)

16.11 Ward Action Plan for Ward 09

16.11.1 Demography

As per the BBS 2011, this Ward had a population of 2231 persons. Population projection shows 2827 population for the year 2031. For the same year, it has a density of about 11 persons per acre (ppa) and it will be 13 ppa in 2031. The following table shows the details.

Table 33.41: Population Statistics of Ward No. 09

Item	Year	
	2011	2031
Area (acre)	209.47	209.47
Population	2231	2827
Density of Population (per acre)	11	13

16.11.2 Critical Issues and Opportunities of the Ward

Ward no. 09 is mostly rural character and has scattered settlement. Here the basic facilities and infrastructures required for an urban area are not established yet. There is absence of water supply system. Like all other Wards, water supply is also a critical problem in this Ward. Surface water is the main source of drinking and washing. When population will increase the existing ponds will be inadequate to supply adequate water for the local people that will lead to water crisis. Moreover, there is lack of arrangements for proper maintenance of the ponds. There is likelihood that without proper maintenance caretaking the ponds might get polluted by unhygienic use of water that will endanger health of the local people.

There is also no systematic drainage network in this ward. Solid waste management facility is absent here. There is also lack of recreational and educational facilities.

Very low density and scattered settlements are the main obstacles for infrastructure development, which is not adequate to run large retail business activities. This size of population will not help to grow the local economy.

Development Opportunities

i. Low Density of Population

The present density of population in this Ward is 11 ppa. From environmental point of view, this population can create a very livable environment for the area with respect to ventilation, use of road and other basic services.

ii. Good External Connectivity

It has the good external connectivity with surrounding upazila and district town such as Kushtia, Rajbari, Pabna and Jhenaidah.

iii. Potential for Small Scale Manufacturing

Cheap labour, availability of raw materials and agricultural land can help grow small scale manufacturing and agro based industry in this town. Furniture making as a processing industry has already established its roots in the town. Jewelry, handicrafts of different kinds, and small engineering works can be developed here. This, however, would require

local initiative. Local entrepreneurs may be provided with small capital as incentive toward initiating business ventures based on local potentiality.

16.11.3 Proposals and Plans for Ward 09

After reviewing and commensurating the policies and proposals of Structure Plan and Urban Area Plan the following proposals are made in the Action Plan of **Ward 09** for implementation. Ward Action Plan Map for Ward 09 is shows in **Map 16.17**.

Table 33.42: **New Land Development Proposal (DP) of Ward No. 09**

ID	Proposal	Location	Ward No.	Area (acre)	Mouza Name	Plot No.
NM-04	Neighborhood Market	Beside Mirzapur Road	Ward 9	0.668	Mirzapur_ 69_00	544, 578-581
TS-03	Tempo Stand	Beside Sree Patipur Sarak	Ward 9	0.308	Mirzapur_ 69_00	205, 206
WC-09	Ward Center	Near Mirzapur West Para Jame Mosque	Ward 9	0.405	Mirzapur_ 69_00	144-146
WTS-03	Waste Transfer Station	In Mirzapur	Ward 9	0.221	Mirzapur_ 69_00	263-266

Map 33.17: Land Use Plan Map for Ward No. 09

16.11.4 Proposed Road Infrastructure Development

The detailed scenario of Road Widening and New Road Development Proposal for this word is given in the following table.

Table 33.43: Widening and New Road Development Proposal in Ward No. 09

Ward No.	Proposed Road ID	Proposed Road Type	Proposed RoW (Feet)	Proposed Status	Length (KM)
9	TR_N_10	Tertiary Road	30 ft	New Construction	0.23
9	PR_W_06	Primary Road	80 ft	Widening	1.05
9	SR_W_18	Secondary Road	40 ft	Widening	1.01
9	TR_W_48	Tertiary Road	30 ft	Widening	0.92
9	TR_W_49	Tertiary Road	30 ft	Widening	0.82
9	TR_W_50	Tertiary Road	30 ft	Widening	0.39
Total					**4.42**

16.11.5 Drainage Development Plan

Among the natural drainage facilities, Betraboti River passes through the middle of this paurashava. The proposed drainage facilities will be developed based on this natural water body. The river will serve as primary outfall and will be connected with primary drain, secondary drain and tertiary drain. The detailed scenario of Drainage Development Plan Proposal for this word is given in the following table.

Table 33.44: Proposed Drainage Development Plan Proposals for Ward No. 09

Drain Type	ID	Width (m)	Outfall	Length (m)
Secondary Drain	SD-15	0.762	Betraboti River	390.19
	SD-16	0.762	Betraboti River	571.83
	SD-17	0.762	Betraboti River	381.95
Tertiary Drain	TD-34	0.457	Betraboti River	0.457
Total				**1344.427**

16.11.6 Priority Tasks

Land acquisition for proposed development is the main tasks for development of this ward in the first phase of the Master Plan. First by seeking voluntary contribution of land and / or purchase of land through negotiation. In case negotiation fails, the compulsory land acquisition power will be applied to procure land. Attempt will be made to seek contribution of land from adjacent landowners for widening of existing narrow roads. For new roads the landowners will be negotiated to sell their land to the development authority. In case the landowners fail to reach on an agreement the development authority may use its power of compulsory land acquisition to procure necessary land. Again provisions of Electricity, Gas with construction of Road network and Drains are the prime tasks for development of the area. The following priorities has identified after the Public consultation meeting at Kalaroa Paurashava.

Table 33.45: Proposed Priority Tasks for Ward No. 09

Priority-1		Priority-2		Priority-3	
Type	**ID**	**Type**	**ID**	**Type**	**ID**
Development Proposal	WTS-03	Development Proposal	TS-03	Development Proposal	-
Road	LR-98	Road	LR-101	Road	-
Drain	SD-15, 16	Drain	SD-17	Drain	TD-34

Map 33.18: Proposed Road, Drainage and Utility Services Plan (Ward No. 09)

16.12 Implementation Guideline

The Master Plan of Kalaroa Paurashava will be an effective tool for planned urban development, if it is implemented properly with legal enforcement. The different components of the Master Plan have varied implications if they are not implemented in an integrated manner. There is no separate laws related directly to the implementation of Master Plan of the Paurashavas in the country other than the Local Government (Paurashava) Act 2009 and some relevant national policies and laws as discussed in chapter 5 under the Structure Plan.

However, the legal provisions that have been made in the Local Government (Paurashava) Act, 2009 can effectively be applied in the implementation of the Master Plan of Kalaroa Paurashava for the time being along with other relevant national policies and laws that have also implications at Paurashava level, such as Playfield, Open space, Park and Natural water reservoir Conservation Act, 2000 and BNBC 1993. Other national policies, guidelines and laws relevant to population, agriculture, environment, tourism, building materials, building construction etc. have implications for the implementation of various components including the Ward Action Plan of the Master Plan of Kalaroa Paurashava.

Therefore, until specific laws and guidelines are made by the government for the Paurashavas in Bangladesh for the implementation of Master Plans, the existing laws, policies and guidelines should be strictly followed so that the goal and objectives of these plans are achieved. Effective application of the various existing policies and laws require prudent exercise of professional knowledge and expertise, which is lacking in the existing human resources of the Paurashavas in Bangladesh. In particular, the Paurashavas require professional urban/town planner(s) in the setup of their manpower. In this context, there is an urgent need for the creation of a planning division/section in the existing set up of the Paurashava Organogram.

16.12.1 Proposals for Mitigation of Identified Issues

The critical issues of planning and development identified in the Structure Plan have been addressed through the preparation of Urban Area Plan and Ward Action Plan. The proposals made in these plans resolve the issues rose in the Structure Plan.

16.12.2 Comparative Advantage of Master Plan

The Paurashavas in Bangladesh do not have any practicing plans at present in regard to organized development of land use or infrastructure. This situation has been continuing over a long period of time in the past promoting spontaneous land and infrastructure development. As a result, there are examples of unplanned development creating discomfort to the people living in almost all Paurashavas in the country. The implementation of the currently prepared Master Plan of Kalaroa Paurashava will remove those obstacles by applying the principles, guidelines and proposals of various components of its Master Plan. The Ward Action Plan prepared following the Urban Area Plan will solve the most pressing needs of the town in infrastructure development.

16.12.3 Conclusion

The Paurashavas in Bangladesh for the first time in its history are having their detailed Master Plans prepared scientifically using modern tools and techniques. These Master Plans will be effective tools for planned development of most of the urban centers in Bangladesh. The planned township development will also ensure required services for the rural areas of the country. This in turn will make a positive impact on economic growth, social progress and environmental sustainability. The Kalaroa Paurashava must avail this opportunity for its progress in the future by implementing the Master Plan.

Chapter 17

Concluding Remarks

17.1 Conclusion

In order to make the plans sustainable through people's participation, it is now emphasized involvement of the local stakeholders in the planning development process. Such participation creates a sense of ownership of the plan among the stakeholders that brings support for the plan and helps to create favorable conditions to implement the plan provisions. Keeping this approach in mind the present Structure Plan, Urban Area Plan and Ward Action Plans for Kalaroa Paurashava has been prepared. It will shape and guide the growth of city in order to meet its social, cultural, environmental, economical, and recreational and many other needs of city dwellers.

The Kalaroa Paurashava will be not only the custodian of the plan; it will also be responsible for implementing much of the development projects. Besides, it will also be responsible for monitoring implementation of the development projects by other urban development and service giving agencies. This situation calls for strengthening the existing capacity of Paurashava to handle future volume of work.

The current plan opens up a new horizon of development opportunities and land use control through policy guide lines in broad sense and detailed development proposals unto a very micro level. The land use areas have been marked indicating the mouza and dag numbers. It is expected that control of land use development contrary to the Plan can now be prevented more easily. This will require exercise of power with more vigor and sincerity.

It is not possible for the government alone to go for plot to plot development as per plan with its meager resources. This calls for involving stakeholders, particularly, the land owners in the development process. Such initiative is possible at the local level infrastructure development, where the land owners will be directly benefited. In case of wider level development the development authority can take initiatives for infrastructure cost realization from land owners though evolving innovative mechanism.

Rule of law must be established. A culture of law obedience must be created among the people in general and such practice should start with government agencies first, who often are found not following the regulations of building plan approval. It is hardly possible for the government to control all irregularities unless the people themselves become conscious and cooperative. If necessary stringent measures should be taken against the violators to make people abide by laws.

Regular monitoring of the plan implementation is necessary together with monitoring of urban development trend in new areas. Monitoring would help early detection of problems and suggesting solutions for their amelioration. An early measure in tackling problems can not only save huge public money, but also the miseries of the city dwellers. It is expected that the proper implementation of this plan with close monitoring will make this prosperous city livable, healthy and will bring overall socio-economic development in future.